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UNIVERSITY OF TORONTO

REPORT OF THE DEAN

OF THE

FACULTY OF MEDICINE

Session 1959-1960

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THE DEAN OF THE FACULTY OF MEDICINE

There has been general concern in most areas of Canada in the last few years because, with a rapidly increasing population, there seems to be a decline in the numbers of good candidates applying to enter medical schools. Approximately one-third of the newly registered practitioners in the Province of Ontario during the period 1954–9 were qualified in schools outside Canada. There has been some evidence however in the past year that there will shortly be an increase of applications for medical schools, as indeed there will be in all the divisions of our universities. As has been our custom for the past five years, in the autumn of 1959 we admitted approximately 125 students to the first premedical year, and in the spring of 1960 we selected another 48 candidates for entry to the first professional year in the session 1960–1. It seems inevitable that in the next five years there will be many more good Canadian applicants than there are places available in the country. The Association of Canadian Medical Colleges is moving to set up a national secretariat in association with the Canadian Medical Association and the Royal College of Physicians and Surgeons, so that the need for new schools may be examined and other urgent matters relating to Canadian medical education may be studied. It is unlikely that immigration will continue to supply physicians for our rapidly increasing population.

The Toronto class of 1960 will make a considerable contribution to future demands of Canadian medicine. At the annual Convocation for Law and Medicine on June 10th, 138 men and women were graduated with the degree of Doctor of Medicine. On the same occasion 2 doctors received the degree of Master of Surgery, while 16 were awarded diplomas in Psychiatry, 10 in Medical Radiology, 17 in Public Health, and 6 in Industrial Medicine. At an earlier ceremony 47 were awarded diplomas in Physical and Occupational Therapy, and 5 members of the first class to complete the new course were given diplomas in Speech Pathology and Audiology.

The Faculty has been granted liberal support from the Kellogg Foundation to undertake a long-term study of the curriculum, and at the same time to examine methods of administration and the possibility of increasing its numbers of students under some device of decentralization. Professor Wightman, the chairman of the sub-committee charged with this task, recently held a two-day meeting attended by the majority of department heads at a summer lakeside club some forty miles from the city. Everyone who attended felt that this was a highly successful introduction to what will be a very extensive study. It will be desirable to have a full-time executive secretary who can correlate various studies and collect information and survey material, but such a person is not yet available.

The President of the University has established a committee to examine the relationships which exist between the Toronto General Hospital and the University. Professor John Hamilton as chairman, and Professor Kenneth Gray as executive secretary, have already collected much useful information based on examination of Acts of the Provincial Legislature and other documents and agreements extending over half a century. There is obviously need for much revision and clarification in the light of present-day needs and practice.

The work of the Committee on Loans and Bursaries of the Faculty has steadily increased in the past few years. Although there has been an increasing amount of money available—and in this respect the Medical Alumni Association has made a notable contribution—there is no question that many students are hard put to find money to continue with their course. In other reports I referred to the fact that a certain number of bright students fail to reach the university because of finance. Certainly, others who are able to come with only limited support put medicine at the bottom of the list because of the costs which extend over six or seven years. If

Canadians really set some store by higher education, if they truly believe that gifted young men and women are more likely to assume positions of leadership and contribute to the well-being of the nation through the best education that is available in our universities, surely there is some way of assuring them reasonable financial support other than through this social welfare effort in which all faculties and schools must engage, in an attempt to see that the funds available are reaching those who are most deserving. In the meantime, the University finds no other way to balance its budget but by an increase in fees (Medicine is now $650 plus $57 incidental) which comes into effect at the opening of the autumn session.

We are grateful to the Alumni, to the University, to many private donors, and to the Provincial Government for the help which makes it possible to keep our students at the University. The students themselves take on a variety of jobs in order to make money. It is doubtful whether in the last two long vacations of a professional course they are adding much to their future in medicine if they spend four months at some job completely divorced from scientific effort. I have on occasion upheld the advantages of this diversity of effort in a summer vacation but I believe firmly that at least in the last long vacation, and preferably also during the period between his second and third year, the student should be doing work in a hospital or a research laboratory.

The Faculty has continued to enjoy strong support for its research programmes, as is amply evident from the testimony of the department heads. Indeed the total amount of money available from outside sources for research is rapidly approaching the amount of the University teaching budget, and inevitably a certain amount of that regular budget is used for research and graduate training. We would gratefully acknowledge support from the Federal Government granting agencies, the National Cancer Institute, the Ontario Cancer Treatment and Research Foundation, the Alcoholism Research Foundation, the Ontario Heart Foundation, the Canadian Arthritis and Rheumatism Association, the Canadian Life Insurance Officers Association, the J. P. Bickell Foundation, the Canadian National Institute for the Blind, the Atkinson Foundation, the McLean Foundation, the Muscular Dystrophy Association of Canada, the Multiple Sclerosis Society of Canada and many private donors. It will be noted in the report of the Department of Ophthalmology that the generous gift of Mr. H. G. Stapells has enabled Dr. Elliot and his colleagues to correlate the research programme under the direction of Dr. Basu who has come to us from India.

The R. Samuel McLaughlin Foundation, as well as providing travel funds for senior graduate students in training for staff appointments, has this year made available a visiting professorship in memory of the late Professor Edward Gallie. The professorship will provide for a distinguished teacher to visit one or two medical schools in Canada for a period of six to eight weeks. It is expected that the first visiting professor will come to Canada in the late autumn of 1960.

The Division of Postgraduate Medical Education is responsible for a steadily increasing number of short courses, as well as for maintaining its programme of decentralized clinics in several medical communities. A new diploma in Anaesthesia has been authorized by the Senate. This will be available to a small number of students who spend three years in practical training, basic science studies, and research methods. An advanced degree for candidates who seek training in modern methods of clinical investigation is now under consideration by a special committee. The division is grateful for financial support from the Department of Health of the Province which aids in its programme of decentralized clinics.

The new Division of Rehabilitation Medicine has the responsibility for the diploma courses in Physical and Occupational Therapy, and in Speech Pathology and Audiology, as well as for training a limited number of physicians who are specializing in Physical Medicine. Moreover, it illustrates the interest and leadership of the University in a field where there seem to be such wide and sometimes diversified community efforts.

Visitors

Our Middlesex Visitor for 1959–60 was Mr. W. R. Winterton of the Department of Obstetrics and Gynaecology at the London School. Our own representative to London, Dr. Hurst Brown, Physician-in-Chief to the Western Hospital, has just completed a visit to the Middlesex. Dr. Walter G. Maddock of Chicago gave the Balfour Lecture in October. Dr. Harold R. Griffith of Montreal gave the first Harry Shields Lecture to a large group of anaesthetists from many parts of Ontario. Dr. Shields himself introduced the lecturer. Dr. Frank B. Walsh of Baltimore gave the second Walter Wright Lecture in Ophthalmology. Dr. Frank S. Brien of the University of Western Ontario delivered the Phi Delta Epsilon Lecture. We have had the pleasure of hearing several other distinguished teachers from the United States and the United Kingdom and other parts of the Commonwealth. The Professor of Medicine and Therapeutics in Glasgow University, Dr. E. J. Wayne, spent a week with us as the Sims Travelling Professor.

Buildings and Hospital Plans

The rehabilitation programme of the older areas in the Toronto General Hospital continues. The opening of new areas still presents some difficulties because of shortage of nursing personnel. The building programme of the Toronto Western Hospital is proceeding according to plan, and when completed the hospital and its laboratories will constitute a completely modern and well-equipped teaching and treatment centre. The Psychiatric Institute and Hospital is happily launched with the appointment of an architect and the assurance of a site at the corner of College and Huron streets with a strip of land going westwards to an opening on Spadina Avenue.

With the signal success of the University campaign for funds it is hoped that early priority will be given to the much needed additions to the Banting Institute. The constantly expanding research of the Departments of Surgery, Medicine, Obstetrics and Gynaecology, Oto-laryngology and Ophthalmology has created a condition of overcrowding both for workers and for animals that can scarcely be longer justified. In the meantime, Professor Best has been fortunate in securing a very liberal contribution from the Wellcome Trust of England which, when matched by the University, will allow for the completion of the Best Institute laboratories according to the original plans. There has also been great interest on the part of a donor who wishes to help finance a building to house the ever broadening and important programme of ophthalmic research which has developed under Professor Elliot and his colleagues, and is now directed by Professor Basu. The natural site for such a building would be on the ground east of the Banting Institute on College Street, presently owned by the Government of Ontario. It is hoped that it will be made available to the University for extension of its future medical research.

The Wellesley Hospital achieved independent corporate status on January 1, 1960, with its own governing Board. A new agreement between the University and the Board ensures its status as a teaching institution of the medical school. The new Board has plans for an additional wing to provide more teaching beds, as well as an enlarged out-patient department.

Staff

The retirement of Professor Ray Farquharson as the Sir John and Lady Eaton Professor of Medicine and Physician-in-Chief of the Toronto General Hospital may well be reason to consider again what is a suitable retiring age for members of clinical departments in a medical school. Professor Farquharson's tremendous capabilities and undiminished vigour fortunately will be turned towards an important national effort, for he is to become the Director of the Medical Committee of the National Research Council. If the recommendations of a special committee, appointed by the Federal Government at the request of the Association of Canadian Medical Colleges, are accepted he will almost surely be the first chairman of a newly created Canadian Medical Research Council. Professor Farquharson has a national and international reputation as a teacher and scholar. Beloved and respected by students and colleagues he seems to possess with all the other great qualities of a physician that particular ability to share other men's burdens, whether they be those of patients, students, residents, or colleagues.

Professor K. J. R. Wightman, who succeeds to what is one of the most responsible and indeed onerous positions in the world of medical education, is a product of the discipline and philosophy established by Dr. Duncan Graham and carried on by Dr. Farquharson. His brilliant career gives promise of success in his new responsibilities. To ensure that success he will need to be relieved to some degree of the ever increasing burdens that have accumulated with the growth of the school in relation to the positions of Physician-in-Chief of the General Hospital, and Professor of Medicine in the University.

Dr. H. H. Hyland and Dr. Ernest Maltby are relinquishing their teaching duties in the Department of Medicine, but both doctors will continue in the practice of their respective specialties, neurology and gastro-enterology. Their valuable services as teachers and their care of patients on the teaching wards of the General Hospital are greatly appreciated by generations of students, house physicians, and former patients of the hospital. Professor A. M. Wynne retires as Head of the Department of Biochemistry but we are happy that he will come back to us as a Special Lecturer. Under his guidance the Department has undertaken increasing responsibilities for instruction in the faculties of Arts, Dentistry and Pharmacy, and at the same time has achieved an enviable record in the teaching of graduate students and the accomplishment of sound research. Professor Charles Hanes, a Canadian who has spent many years in Cambridge, and who returned to this department nine years ago, assumes the responsibility for the administration of the Department with the beginning of the new academic year. Dr. D. L. J. Bilbey of the Department of Anatomy returns to London to the post of Reader in the Department of Anatomy at King's College. Our good wishes go with him in his new appointment. Dr. Ivan Junkin and Dr. N. S. Clark retire from the staff of Anaesthesia in the Faculty of Medicine but will continue to practise the specialty to which they have introduced so many students and residents at the Hospital for Sick Children and the General Hospital. Mrs. Louise Gordon has resigned from the Department of Art as Applied to Medicine because of pressure of outside work.

Miss Kathleen McMurrich has retired from the Department of Anatomy. She will be gratefully remembered by the generations of physical and occupational therapists who learned their anatomy under her vigorous and kindly direction. Her ability as a teacher and her love for anatomy she inherited from her distinguished father who directed the Department here from 1908 to 1931.

Dr. Donald Graham of the Department of Medicine has resigned to accept a post as Editor-in-Chief of the *Journal of the Canadian Medical Association.* The Faculty wishes him every success in his new and challenging assignment.

The medical community was saddened by the death in October of Dr. William Edward Gallie, Emeritus Professor of Surgery, and Dean of the Faculty of Medicine from 1936 to 1946. As Professor he followed his friend and teacher the late Dr. Clarence Starr who was the first surgeon to be appointed as a geographic full-time professor when the school was undergoing reorganization in 1919. Dr. Gallie built soundly on the foundations so carefully and thoughtfully laid by Dr. Starr. Through his remarkable qualities as a surgeon, a teacher, and an investigator, he added lustre and international distinction to the Chair which had been established with Rockefeller support in 1919.

Honours

Dr. R. A. Gordon was Co-president, Section of Anaesthesia, Conjoint Meeting of the B.M.A.–C.M.A., Edinburgh, July, 1959. He was also Visiting Teacher in Anaesthesia, University of Washington, Seattle, November, 1959. Dr. R. H. Meredith was elected President, Canadian Anaesthetists' Society, 1959–60. Dr. Iain M. MacKay was promoted to Lieutenant-Colonel, and appointed to command of the 26th Medical Company, R.C.A.M.C.(M), and awarded the C.D. Professor D. E. Cannell was President of the Society of Obstetricians and Gynaecologists of Canada during 1959–60, and Dr. Gerald Cosbie has been elected President of the Society of Pelvic Surgeons for 1960–1. Dr. R. G. C. Kelly was elected President of the Defence Medical Association of Canada. Dr. G. Arnold Henry was elected President of the Canadian Otolaryngological Society and Vice-chairman of the Section of Otolaryngology at the joint B.M.A.–C.M.A. meeting in Edinburgh, 1959. Dr. K. McAskile was elected to the Council of the Canadian Otological Society. Drs. Douglas P. Bryce and Blair Fearon were elected Fellows of the American Triological Society.

Professor J. D. Hamilton was appointed Chairman of the Medical Advisory Committee of the Ontario Heart Foundation. Professor A. L. Chute delivered the Arnold Memorial Lecture at the University of Buffalo. Dr. C. Collins-Williams was elected President of the Ontario Allergy Society. Dr. J. H. Ebbs was Chairman of the Programme Committee, Ninth International Congress of Paediatrics. He also delivered the Paul Bevan Lecture at the University of Buffalo. Dr. William Hawke has been made a Fellow of the Royal College of Physicians of England. Dr. R. J. Slater was elected President, Canadian Society for Clinical Investigation. He was Visiting Professor, Department of Paediatrics, University of Vermont, April, 1960. Dr. C. E. Snelling was appointed Director of Medical Services for the new I.O.D.E. Children's Hospital.

Professor Harold Kalant was appointed Assistant Director of Research for Biological Studies of the Alcoholism Research Foundation. Professor E. A. Sellers was appointed Chairman of the Sub-committee on "Human Engineering and Psychophysiology," Human Resources Advisory Committee, Defence Research Board. Professor J. W. Scott was elected President of the Eastern Association of Electroencephalographers. Professor C. H. Best received the degree of Doctor of Laws (*honoris causa*) from the University of Edinburgh, and the degree of Doctor of Science (*honoris causa*) from Northwestern University; he was the first recipient of the Dale Medal of the British Society for Endocrinology; and was elected an Honorary Fellow of the American College of Gastroenterology. Professor K. J. R. Wightman was appointed Annual Lecturer in Medicine by the Royal College of Physicians & Surgeons of Canada. Professor A. C. Singleton has been elected President of the Tenth International Congress of Radiology, to be held in Montreal, August, 1960. Professor C. L. Ash has been made Chairman of the Advisory Committee on Radiation Therapy of the National Cancer Institute of Canada. Professor H. E. Johns has been appointed foreign editor of the *Journal of Radiation Research* and the *British Journal of Radiology*. He has also been Chairman of the Committee of High Energy Therapy of the International Commission on Radiological Protection. Dr. O. H. Warwick has been appointed a director of the National Cancer Institute of Canada.

Dr. W. G. Bigelow was a participant in a Cardiac Surgery Symposium of the International Cardiovascular Society, in Munich, September, 1959. He was also an invited guest at the 27th Congress of Russian Surgery in Moscow in May, 1960. Dr. R. B. Salter was awarded the 1960 Medal in Surgery of the Royal College of Physicians and Surgeons of Canada. Dr. A. T. Jousse was elected a vice-president of the World Association of Physical Medicine and Rehabilitation, convening in Washington in August, 1960. Mrs. Thelma Cardwell was elected Honorary Secretary-Treasurer of the World Federation of Occupational Therapists. She will be Canadian delegate when the council meets in Australia in September, 1960.

Professor R. F. Farquharson was elected a Fellow of the Royal Society of Canada, and Regent of the American College of Physicians. The degree of Doctor of Laws (*honoris causa*) was conferred on him by Queen's University and by the University of Alberta. Professor W. Hurst Brown was a Visiting Professor to the Middlesex

Hospital Medical School in London. Dr. J. Allan Walters wes elected President of the Canadian Neurological Society. Dr. Jean F. Davey was elected a Fellow of the American College of Physicians. Dr. A. B. Stokes was elected to the Executive Committee of the American Psychiatric Association Council. Dr. J. G. Dewan was elected President of the Canadian Psychiatric Association. Dr. K. G. Gray was elected Chairman of the committee on psychiatry and the law of the American Psychiatric Association, and was appointed associate editor of the American Journal of Psychiatry. Dr. Alan Parkin was elected Vice-president of the Canadian Psychoanalytic Society. Dr. C. B. Farrar received the Second Annual Nolan D. C. Lewis Award from the New Jersey Neuro-Psychiatric Institute, Princeton.

Again I would acknowledge with grateful appreciation the work of a small group of secretaries who with efficiency, cheerfulness, and courtesy are responsible for an increasing amount of work in the administration of the Faculty.

J. A. MacFarlane

DIVISION OF POSTGRADUATE MEDICAL EDUCATION

Under the direction of Professor R. Ian Macdonald

Two hundred and ninety-five graduate students were registered with the Division for full-time work in either clinical or basic science departments and 487 were enrolled in special short courses offered during the year. A total of 782 represents an increase of 282 over the 1958–9 session. In addition, a large number of doctors in twelve centres in Ontario attended the extra-mural clinics during the year.

A regular series of lectures was scheduled for graduate students in Medicine, Surgery, Urology, Obstetrics and Gynaecology, and the Departments of Pathology and Anatomy provided additional instruction designed to meet the special needs of the different graduate groups. These special classes were arranged for hours least likely to conflict with hospital and departmental responsibilities.

The advanced graduate courses in Medicine, Surgery, and Obstetrics and Gynaecology which have been offered by the Faculty for a number of years were given over a six weeks' period from August 17th to September 25th, 1959. The courses were designed to provide advanced instruction to graduates in medicine who have had a good deal of training in hospital or experience in practice, and the teaching has been organized to give the student a critical appreciation of the field in which he is particularly interested. Sixty candidates registered for these courses.

Three hundred and ninety-five doctors active in practice took advantage of the increased number of special courses given during the year in Toronto. A larger number attended the extra-mural decentralized clinics held in twelve centres in Ontario. The special courses designed to meet the different needs of men in practice included "Surgical Emergencies in General Practice" (41); Anaesthesia—two courses with 62 registered; Paediatrics—two courses with 76 registered; Public Health refresher course (52); Industrial Medicine (31); "Orthopaedic Aspects of Neck and Shoulder Pain" (45); the third annual course in Fractures and Trauma (20); a refresher course in Eye Surgery (52); and "The Use of Radioactive Isotopes" (16). These courses were arranged by the departments concerned and in many instances colleagues from other departments assisted in the instruction. The curriculum for each course was planned carefully with the needs of the group for whom it was designed being kept in mind. The doctors taking the different courses showed a good deal of interest and the different teachers found that the questions put to them in the discussion periods indicated a high level of professional knowledge among the graduate students. These special postgraduate courses brought to the Medical School not only a number of our own graduates but also graduates from other Canadian schools and from abroad.

The Medical Alumni Course in which the Faculty co-operated, brought some 283 doctors for a three-day course in late October, 1959. General sessions were held in the Sunnybrook Hospital auditorium and case demonstrations were offered at the Toronto General Hospital in dermatology, gastro-enterology, orthopaedic problems, pulmonary disease, gynaecology, and neuro-surgery and at Sunnybrook Hospital in physical medicine, gastro-enterology, cardiology, haematology, arthritis, and neurosurgery. This was a very well organized course and the Postgraduate Committee appreciated the continued interest of the Medical Alumni in furthering postgraduate education.

Decentralized clinics were held in twelve centres in Ontario where forty-one clinical days were held. Seventy-two university teachers took part in these programmes. Special clinics in cardio-vascular disease were held in four centres with the support of the Ontario Heart Foundation. Eight teachers took part in these special clinics. The majority of these extra-mural clinics were very well attended by the profession in the area visited as well as by the doctors in adjoining areas. As in previous years the University teachers who conducted the clinics felt that they were most useful to both the local doctors and the teaching group.

During the year the Division continued to co-operate with the Education Committee of the Ontario Medical Association and at the request of the committee arrangements were made for twenty-one speakers to visit branch societies and deliver papers on topics suggested by the local group.

DIVISION OF REHABILITATION MEDICINE

Under the direction of Dr. A. T. Jousse

The establishment of the Division of Rehabilitation Medicine in the Faculty of Medicine was achieved on November 15, 1959. The responsibility of the Division is to carry out the training of medical students and medical graduates, including those who wish to specialize in Rehabilitation. As well, the training programme of Physical and Occupational Therapists and Speech Pathologists is a responsibility of this Division.

At the May graduation, forty-seven young women received diplomas in Physical and Occupational Therapy. Of this group, the majority obtained placement in Ontario; but a few will seek employment in other provinces, and one or two in the United States or Great Britain.

An increased enrolment in the first year is, we hope, an indication of renewed interest in this type of work amongst graduates of secondary schools. Through the Guidance Departments of the secondary schools in the metropolitan area, presentations have been made on "Career Days" which inform interested students and parents of the nature of the work, the need for persons trained in this field, and the satisfaction to be derived therefrom.

Open House was again a successful occasion, put on by the undergraduate body and visited by parents, high school students, and interested university students. Some interest in physical and occupational therapy may have been created in the minds of high school students by the display at "Mediscope." This included demonstrations of rehabilitation medicine as well as specific information about the place of physical and occupational therapists in this treatment programme.

The establishment of a school for the training of therapists in Winnipeg is approaching realization, and will be headed by a former member of our teaching staff, Miss M. Spence. High hopes are held that a similar step will be taken in Halifax. The need for trained teachers still exceeds the supply. At present there is one candidate who has successfully completed the first year of the teacher's training course.

In May five candidates graduated in the diploma course of Speech Pathology and Audiology. This class is the first to graduate from the school in Toronto and all members obtained positions within the confines of the city.

PUBLICATIONS

GODFREY, C. M. and JOUSSE, A. T. "The Course in Speech Pathology and Audiology, University of Toronto" (*New Zealand Speech Therapist Journal*, Nov., 1959, p. 3).

GODFREY, C. M. and LAWSON, G. A. "The Rehabilitation of Hemiplegia" (*Department of Veterans' Affairs Film Library*, 1959).

JOUSSE, A. T. "In the Age of Stress Lies Catastrophe" (*Globe and Mail*, Toronto, Oct. 23, 1959, p. 7).

MEDICAL SOCIETY

(September, 1959 to June, 1960)

Honorary President	Dean J. A. MacFarlane
Honorary Secretary-Treasurer	Dr. C. C. Gray
Chairman	Dr. Ian van Praagh
President	Bob Lee
Vice-President	Allan Hart
Treasurer	Dr. Paul Takahashi
Secretary	Miss Joy Armstrong

This has been an interesting and active year for the Medical Society Assembly. We have continued to organize and sponsor the time-honoured activities and projects of the Society and have managed to introduce a few innovations. The success of any organization depends on its individual members, and I feel that the Society has been blessed this year by a remarkable collection of enthusiastic, capable individuals. The President has had to be constantly on his toes in an attempt to match the enthusiasm of the Assembly members. I can say with firm assurance that there has not been a single weak link in our Assembly this year. The bi-monthly meetings have been held under the able chairmanship of Dr. Ian van Praagh, who has done an excellent job of conducting the meetings in an informal, but orderly fashion. The following is a summary of the year's activities and the contributions of the individual members.

Finances

The job of Treasurer is a very difficult and demanding one, and Paul Takahashi has handled it very well. Without his cautious objections to excessive spending, I am sure that the enthusiasm of the Assembly members would have carried them well beyond the budget. As it is, the financial position of the Society is much better now than that which we predicted last fall. However, I would like to make a few general remarks about Medical Society finances. During the past few years the costs of the Medical Society's activities have risen considerably, although we have not undertaken any new projects requiring a great deal of money. It is no longer possible to operate in our present manner with the funds we receive from Simcoe Hall. I feel that the time is drawing near when the Medical Society will require an increase in the allotment from Simcoe Hall. At present we receive $6.00 per premedical student and $8.50 per medical student, and these figures have not changed for several years. In fact, when we take into account the increase in CAMSI fees, we are actually receiving less money for current expenditures now than we were four years ago. In the past two years other campus organizations including the University Athletic Association and the Students' Administrative Council have received substantial increases in their fees allotments. I think that this is indicative of the increasing cost of student activities and I feel that the new executive would be wise to give this matter some consideration and discuss it with the Dean and the Simcoe Hall officials.

Medical Athletic Association

This has been a very successful year for Medical Athletics and we came closer to winning the Reed Trophy than we have for many years. Medicine won three intramural championships and Gord Sellery and his executive deserve much credit for their fine work. In addition, medical students have continued to contribute to intercollegiate athletics and we have had representatives on almost all of the Varsity teams.

M.W.U.A.

Ann-Marie Catherwood has kept us well informed of the activities of the medical women, and once again the M.W.U.A. has had a very successful year. Many of the girls have shown a keen interest in the subsidiary organizations of the Society, and have been a great help.

Panacea

This fall extravaganza was held for the second year and again was disappointing from the standpoint of attendance, and resulted in a large financial loss. I feel that a fall dance of some type is a very worthwhile thing, but the format of Panacea does not seem to be appealing to the students.

At-Home

The attendance at the At-Home was also below expectation, but everyone present felt it was a very successful evening. Al Hart and his committee worked hard on both these dances and deserve credit for providing these excellent social functions for the students. It has been suggested in the past that we have only one band at the At-Home, and I think that this might be a reasonable idea now that we could use the new large room at the Royal York. I might also suggest that publicity for the At-Home be given more emphasis, particularly with regard to the internes and staff members.

Public Relations

The Freshman Reception again proved to be a very worthwhile function with a minimum of expense under Ken Adam's able organization.

Daffydil

Many people have commented that this year's *Daffydil* was the best ever. Most of the success of the show was a result of the hard work of Manfred Harth who also devoted much time to rewriting the *Daffydil* constitution.

Medical Journal

With Peter Dent as editor the *Journal* has maintained its usual high standards, and the interest among the students has been such that the editor has received even more articles than he is able to use.

Arts and Letters

Medical Arts and Letters have been undergoing a revival of interest for the past couple of years and with Dave Preston as Chairman this trend has continued. Dave has added interest to the Assembly meetings with his amusing and informative reports. Interest in the Medical Music Association is still declining, but this is more than compensated for by the increasing popularity of the Osler Society and debates. The art and photography contest also attracted a great deal of interest.

CAMSI

Last year the CAMSI National Executive was from Toronto, and in the fall our Medical Society had the honour of being host for the National Convention. This Convention was well organized by the executive and helped many of us to learn a little more about CAMSI and its functions. CAMSI fills a vital need in providing some unity among the medical students of Canada, and deserves all the support we can give it. Our two CAMSI officers, Bas Orchard and Jeanne Shkimba, have worked hard for the Association and have done an excellent job of keeping us up to date on CAMSI activities.

EAC

Don Armitage and Dick Gladstone, our two hard-working EAC representatives have helped to keep us informed of student activities on campus. It is important for medical students to take some interest in activities outside their own faculty and for at least some of them to take an active part in these activities. With the changes which have been made in the organization of the *EAC,* I think the Society should attempt to have an interested representative on both the NFCUS and the WUS committees.

SAC

Medicine has been well represented this year on the SAC by Clive Chamberlain and June Clarke. Both these people have played active roles on the SAC with Clive being Publications Commissioner and June Chairman of the Music Committee.

Probe

Jim Paupst has shown himself to be something of a financial genius as well as a good editor. The advertising for the Probe has been so well handled that money has been made on the newspaper. All the issues of the Probe have been of a high standard, and we are looking forward to seeing how this new idea of a magazine instead of a newspaper works out.

Warden

Joe Schatzker has handled the Duncan Room affairs in an efficient manner and the new assembly should give careful consideration to his suggestions for next year. The two main problems which face the Duncan Room at present are the maintenance of some degree of cleanliness in the room and the exclusion of non-medical clientele. The purpose of the Duncan Room has been debated at some length during the year and we have heard a great deal about the cafeteria vs. commonroom controversy. We should keep in mind two things when considering this topic. First, there is an obvious shortage of lunchroom facilities on the campus and the Duncan Room does provide a service for the medical students in this respect. Secondly, the Duncan Room provides a substantial source of income for the Medical Society which will be needed at least until such time as we receive a larger allotment from Simcoe Hall. The purchase of new lounge furniture and the enforcement of more orderly conduct in the room should create a better atmosphere.

Staff-Student Committee

With the hard work of Lionel Dorfman this committee has been given a new spark of life. The appointment of three staff members to meet with the committee has produced a definite improvement, and two successful meetings have been held, with a third one planned for the next few weeks. I feel that among their many grievances and criticisms, medical students do occasionally have valid suggestions for changes or improvements in the course. We hope that with staff members on the committee some of these ideas will be channelled through to the Faculty Curriculum Committee, and to the individual staff members concerned.

Year Presidents

These stalwart gentlemen are very important since they are the direct representatives of the students and convey our ideas and decisions to the rest of the faculty. Don Butt, Gary Goldthorpe, Frank Lewis, Dave Appert, Herb Tanzer and Herman Hugenholtz have all done commendable jobs in representing their respective classes and in addition have served on the various sub-committees of the Assembly.

Secretary

I have left to the end one of the most valuable and hard-working members of the Assembly. A great deal of the work done by the secretary goes unrecognized, but Joy Armstrong has been of great assistance to me in typing reports, answering letters, arranging meetings, and doing many other tasks.

Constitutional Revisions

We have recognized the need for a revision of the constitution and have passed a number of amendments as a preliminary step. However, a complete re-writing and reorganization of the constitution is necessary and should be carried out in the near future.

I would like to say a word of thanks to our Honorary President, Dean MacFarlane, who has been so interested in the Society and most helpful in many ways.

In conclusion I should like to say how much enjoyment I have received from serving as President this past year. The Assembly members have co-operated and worked in such a manner that my job has seemed more like pleasure than work. To the new president and the new Assembly we extend our best wishes for a successful year.

Robert G. Lee

MEDICAL ATHLETIC ASSOCIATION

(September, 1959, to June, 1960)

Honorary President	Dr. Paul McGoey
President	G. R. Sellery
Vice-President	P. E. Wyshynski
Secretary-Treasurer	S. Frileck
Publicity Director	G. A. Taylor
Quartermasters	J. Zadiyko W. Stager
IV Medical Representative	R. L. Joynt
III Medical Representative	J. Hodgkinson
II Medical Representative	M. Goldman
I Medical Representative	W. Unger
II Premedical Representative	V. Crawford
I Premedical Representative	D. Ellis

The Medical Athletic Association carried on this year with its task of organizing athletics for students in the Faculty. The aim was to get as many students playing as many sports as possible. With this in mind an effort was made to interest the freshman class in athletics, by sending out letters about the facilities available and by appointing senior students to coach freshman teams. Senior students were encouraged to take part in less time-consuming sports.

The fall sports were quite successful for the Faculty, as Medicine was in the lead at Christmas for the T. A. Reed Trophy. This trophy is given to the faculty which wins the most intramural championships and has the best participation on a per capita basis. Under the leadership of J. Roos, Medicine won its first track and field championship since 1926. The football team lost out in the quarter-finals but the season was encouraging as the team played an exciting brand of football and had thirty-six players on the roster. J. Anderson won the individual tennis championship and Medicine placed second for the team honours. The minor-league volleyball championship was taken for the third consecutive year by a class team from the graduating year.

At Panacea, the annual fall extravaganza and dance held at Hart House, Medicine challenged Engineering in basketball, volleyball, squash, and water polo. However, Medicine won only the squash match and Engineering was presented with an appropriate trophy.

The second annual Staff-Student Golf Tournament was held at the Don Valley Metro course early in October. Owing to the steady downpour the attendance was restricted and the planned banquet was cancelled. It is hoped that more staff and students will take this opportunity to get together next year. Dr. C. Burton and Dr. D. McGreal were tops among the staff golfers, and B. Cutler and W. Stager took the student trophies.

The annual squash tournament organized by S. Schiller attracted thirty-eight competitors, and M. Smith won the James Kineer Memorial Trophy.

The winter sports yielded no championships for Medicine, but participation was good and the interest shown by the junior years was encouraging. The swimmers gained second place in the team standing, and the senior hockey and Premedical basketball teams reached the quarter-finals. The Faculty entered thirteen basketball teams, six squash teams, five waterpolo teams, and four hockey teams in intramural competition.

The high point of the athletic year was the annual banquet held at the Chez Paree Restaurant. Dr. Paul McGoey, our honorary President, spoke on "Methods of Pacing Oneself." Professor R. F. Farquharson was presented with an honorary special award on his retirement as Professor of Medicine. Dean MacFarlane presented thirty-eight first colour awards to deserving athletes as well as the Tom Boeschenstein Memorial Trophy to J. Brooks. This award is given to the student who, having completed the premedical course, has contributed the most to intramural athletics.

I should like to thank the executive for their enthusiasm and hard work during the year, and to wish the new executive under P. E. Wyshynski and J. Anderson every success in carrying out the activities of the Medical Athletic Association.

G. R. Sellery

MEDICAL WOMEN'S UNDERGRADUATE ASSOCIATION

(September, 1959, to June, 1960)

Honorary President	Dr. Peggy Hill
President	Ann-Marie Catherwood
Vice-President	Beverley Nelems
S.A.C. Representative	June Clarke
Treasurer	Janet Chisholm
Secretary	Christina Hanley
Social Convener	Susan Cannell

The 1959–60 year was a very active and successful one for the Medical Women's Undergraduate Association. The first event on the calendar was a party given for the new girls entering the Faculty by the girls of the fourth medical year. This began the initiation of twenty new girls into the Faculty, increasing membership to an all time high of ninety-eight women in Medicine.

The annual initiation banquet was held at the Town and Country Dining Room. Dr. Duckworth, Professor of Anatomy, was our distinguished and humorous guest speaker.

A tour of the Women's College Hospital, followed by an informal discussion and tea, was given for the undergraduates by the Federation of Medical Women in Canada on November 7th; this event was much appreciated by the pre-medical and early medical years.

This year a general meeting was called at Christmas. The executive was introduced, a summary of the constitution was read, and there followed questions and suggestions from the floor concerning future activities of the Association. There were eighty-four members present and all expressed the desire to have this meeting an annual event. The meeting was followed by the annual Christmas party to which each girl brought a gift for the children of the University Settlement House.

A forum was held on February 25th in the Students' Lounge of the Toronto General Hospital. Although the weather left much to be desired, thirty-five girls heard a panel consisting of an obstetrician, a psychiatrist, and a research worker.

The graduates were honoured at a party given by the third-year girls, which brought to a close a very enjoyable year.

I wish to express my gratitude to this year's executive for their willing assistance. It is with every confidence that I wish Beverley Nelems and the incoming executive success in the coming year.

Ann-Marie Catherwood

MEDICAL WOMEN'S UNDERGRADUATE ATHLETIC ASSOCIATION

(September, 1959, to June, 1960)

President	Ann Cuddy
Vice-President	Mary Trotter
Treasurer	Marion Brown
Secretary	Lynn Fredericks
University Athletic Directorate	Lillian Bobson

The year 1959–60 marks an important milestone in the history of women's athletics at the University of Toronto, as in the fall of 1959 the long awaited Women's Athletic Building was officially opened. With this building it is hoped that the athletic programme of future years may be considerably increased. The new building has two standard size gymnasia and one very large one which may be divided by a curtain into two regulation-sized floors. These are all marked for volleyball, basketball, and badminton courts. One of the outstanding features of the building is its swimming pool which has a one and a three metre board, as well as underwater lighting and sound for ornamental swimming, and a gallery accommodating five hundred people. There are also golf cages, tennis courts, and a dance room.

Because the new building was not completed as early as had been anticipated, the interfaculty athletic programme was somewhat curtailed, and the compulsory programme for first year was suspended. As usual, Medicine entered teams in the four major sports of baseball, basketball, volleyball, and hockey. The volleyball team had the best record of the year, and reached the quarter-finals before being eliminated from the competition. Although the baseball and hockey teams did not fare quite so well, enthusiasm was great for these sports too. The basketball team had a two and two record, the two losses coming at the hands of a very strong P.H.E. II team. There was representation from the first premedical year, who composed a considerable part of all the teams.

Medicine contributed several players to the Intercollegiate Volleyball and Archery teams, and the Interfaculty Diving Championship was won by Lillian Bobson, who was also our representative to the University Women's Athletic Directorate.

As the finale to the year's sporting events, the annual banquet was held at Kwong Chow Chop Suey House, with Dr. Bilbey as guest speaker. The past President, Sylvia Kennedy, presented the Athletic Awards which included four Medical M's, one citation to a Senior T, one Junior T, and one third colours.

It is hoped that all those who have taken part in intramural or intercollegiate athletics this year have enjoyed the recreation and relaxation and will continue to support the teams, so that in the future the programme may be extended to make full use of all the additional facilities offered in the new Women's Athletic Building.

Ann Cuddy

SCIENCE AND MEDICINE DIVISION OF THE UNIVERSITY LIBRARY

Reported by Mrs. M. Galt

The total circulation of medical books and periodicals during 1959–60 has increased by 10 per cent over that of the previous year. An increase of 50 per cent is shown in the use of current periodicals, and an increase of 24 per cent in faculty and graduate borrowing. Student borrowing shows a slight decrease of 4 per cent.

In addition to the constant acquisition of new monographs, 25 new subscriptions to medical periodicals were ordered, and a presentation of 175 current periodical titles received from the Canadian Medical Association exchange list.

The book delivery service to the members of the teaching staff, begun last September, has been used extensively. The frequent return of books by this method has increased the availability of the material for other borrowers.

A bequest was received during the year from the late Dr. Robert Noble for the purchase of medical books. Some of these books have already been received and are now ready for circulation.

It has been evident during the year that the introduction of the Library of Congress classification scheme has resulted in the speedier cataloguing of new books, making them available to the borrower soon after publication.

REPORT ON REGISTRATION, SESSION 1960–1

First premedical year	130
Second premedical year	118
First medical year	148
Second medical year	152
Third medical year	152
Fourth medical year	146
Special students	5
Art as Applied to Medicine	2
Bachelor of Science (Medicine)	5
Diploma in Medical Radiology	12
Diploma in Psychiatry	41
Diploma in Public Health	22
Diploma in Industrial Health	3
Graduate students	240
Physical and Occupational Therapy	199
Speech Pathology and Audiology	16
	1,391

FELLOWSHIPS, SCHOLARSHIPS, MEDALS, AND PRIZES

Awarded at Convocation, June 1960

Graduate

Graham Campbell Prize	J. Farkashidy, M.D.
Canadian National Institute for the Blind Fellowships	G. S. Jakerow, M.D. J. C. C. Alexander, M.D.
William Edward Gallie Fellowship	R. W. Jackson, M.D.
William Goldie Prize	J. M. Finlay, M.D., F.R.C.P.(C).
Dr. Arthur F. Haasz Fellowship	G. R. Langley, B.A. (Mt.A.), M.D., C.M.(Dal.)
Interlake Research Award	M. G. Williams, M.D. (Man.), M.R.C.P. (Edin.)
Lister Prize	R. O. Heimbecker, B.A. (Sask.), M.D., M.A., F.R.C.S(C), F.A.C.S.

Minister of Health Gold Medal (Psychiatry)	R. I. Hector, M.D.
O'Keefe Fellowships in Oto-Laryngology	W. H. Johnson, B.Sc., Ph.D. J. Farkashidy, M.D.
James H. Richardson Research Fellowship	A. C. Strickler, M.D.
Starr Medals	M. C. Hall, B.Sc.(Med.), M.R.C.S., L.R.C.P., F.R.C.S.(C) A. Rapoport, M.D., M.A., F.R.C.P.(C) A. Sirek, M.D., M.A.

UNDERGRADUATE

Fourth Medical Year

Cody Gold Medal	L. E. Dorfman
Cody Silver Medal	B. S. Goldman
Cody Silver Medal	M. Barkin
Dr. Benjamin W. Appleton Prize in Psychiatry	M. Barkin B. S. Goldman *Aeq.*
Butterworth Prize	J. K. Nicholson
Chappell Prize in Clinical Medicine	R. E. Mathews
Dr. Jacob Goldstein Scholarship in Obstretrics and Gynaecology	B. S. Goldman
Hendry Memorial Scholarship	R. G. Lee
Medical Alumni Association Scholarship	J. Schatzker
Ellen Mickle Fellowship	L. E. Dorfman
Ontario Medical Association Prize in Preventive Medicine	M. Barkin R. E. Mathews *Aeq.*
Dr. Roy Simpson Scholarship in Paediatrics	J. H. Wait
Starkman Scholarship in Medicine	R. E. Mathews

Third Medical Year

Class of Medicine 1924 War Service Scholarship	J. A. Wright
Franckel Memorial Award	L. M. Jerry
J. F. Hartz Company Prize in Ophthalmology	L. M. Jerry
J. F. Hartz Company Prize in Oto-Laryngology	D. J. McDonald
Frank W. Horner Gold Medal in Paediatrics	W. N. Dale
Ronald S. Saddington Medal in Pathology	L. M. Jerry
Samuel Rotman Scholarship	R. S. Bush
Starkman Prize in Pharmacology and Therapeutics	Miss B. G. Nelems
Starkman Scholarship in Public Health and Preventive Medicine	A. G. Adelman

Second Medical Year

Posluns Brothers Scholarship	F. Rosen
Sandoz Prize in Pharmacology	F. Rosen

First Medical Year

Starkman Scholarship in Anatomy	Miss M. C. Brown
John Zoberman Scholarship	R. Baumal

Second Premedical Year

Famous Players Canadian Corporation Scholarship	F. W. Furlong
Modern Medicine of Canada History Prize	B. C. Stock

ANAESTHESIA

Under the direction of Professor S. M. Campbell

Undergraduate teaching has been carried out in the third and fourth years as previously. The third-year students assisted during the year in giving anaesthetics for tonsillectomies at the Hospital for Sick Children and received seven lectures in the first term. The fourth year received practical instruction in the operating room and were given eight afternoon clinics on anaesthesia.

Postgraduate teaching has been carried out for twenty doctors on the two-year course and six others have been taking a third year, four being Resident Fellows. Also, Dr. Murray Mendelson has been working in the Acute Respiratory Deficiency Unit of the Toronto General Hospital under a fellowship financed by the Abbott Laboratories Limited.

A change in teaching methods for the postgraduate students was carried out on a trial basis this year. Lectures were reduced to a minimum and tutorial group teaching was set up commencing in September. This has proved to be most satisfactory for all concerned although it has been a heavier teaching load on a small group of dedicated tutors.

The Senate of the University has approved a diploma in Anaesthesia, to be given by examination to postgraduate students who have completed a three-year training course commencing July 1, 1961. This will be of particular benefit to foreign graduates returning to their home country to practise. During the past year there have been in the present course graduates from India, Spain, Turkey, Korea, and, under the Colombo Plan, one from Bangkok, Thailand, for special training in anaesthesia for open-heart surgery.

The department was pleased to have the following visitors during the year, Dr. Katherine Lloyd-Williams, Dean of the Royal Free Hospital Medical School, London University, Dr. James Robertson, Lecturer in Anaesthetics, University of Edinburgh, and Dr. R. P. Harbord, Reader in Anaesthetics, Leeds University.

The first annual Harry Shields Lecture was given on October 30th, by Dr. Harold R. Griffith, Professor Emeritus of Anaesthesia at McGill University.

Dr. Charles Ivan Junkin, Chief Anaesthetist at the Hospital for Sick Children and Associate in the department, and Dr. Norman S. Clark, Senior Anaesthetist at the Toronto General Hospital and Clinical Teacher in the department, this year attain the official retirement age. They have both given over thirty years of much appreciated service to the patients and students, and their colleagues are happy that they will continue to be associated with them in practice.

The department is happy to welcome the appointment of Dr. John Edward York, a graduate of St. George's Hospital, London, to the staff of the Toronto General Hospital; Dr. William Jones, a McGill graduate who did postgraduate work at Duke University, to the Toronto Western Hospital; and Dr. Arthur Cole, a Toronto graduate who took his Fellowship training in Toronto, to the staff of St. Michael's Hospital.

The following addresses were given outside the University: by Dr. H. B. Fairley on, "The Treatment of Respiratory Insufficiency," to the Ontario Division of the Canadian Anaesthetists' Society, "The Present Status of Hypothermia," the inaugural address to the Academy of Medicine, Ottawa, "Opposing the Motion That the Educated Hand Remains Supreme," to the Annual Meeting of the International Anaesthetic Research Society in Washington; by Dr. R. A. Gordon on, "Obstetrical Anaesthesia at Toronto General Hospital," to the section of Anaesthetics, Conjoint Meeting B.M.A. and C.M.A., Edinburgh, on "The Anaesthetic Risk" and "Common Problems in Anaesthesia," to the St. John's Clinical Society and the Newfoundland Division, College of General Practice of Canada, "Anaesthesia and Analgesia for Mass Casualties," to the Canadian Civil Defence College, Arnprior, Ontario, on "Canadian Anaesthesia Today," to the Western Division, Canadian Anaesthetists' Society at Victoria, B.C.; by Dr. Brian Marshall on, "Asthma and Anaesthesia," to the section on Anaesthesia, Ontario Medical Association, Toronto; by Dr. Code Smith on, "Anaesthesia for Cardiac Catheterization in Children," to the Tenth Postgraduate Refresher Course of the American Society of Anaesthesiologists, at Miami Beach, Florida.

RESEARCH

Members of the staff have undertaken the following research work:

Dr. Alan W. Conn at the Hospital for Sick Children has been carrying out an investigation of acid base alterations during hypothermia anaesthesia for the repair of atrial septal defects and in collaboration with Dr. R. A. Millar of the Montreal Neurological Institute, Montreal, a series of determinations of blood catechol amine levels during post-occlusion hypotensive phase of repair of atrial septal defects. These projects were financed by funds from the Hospital for Sick Children Research Institute.

Dr. H. B. Fairley has been carrying out a three-phase investigation of the predictability of acid-base changes in anaesthesia and surgery. The first phase, having to do with extra-corporeal circulation has been completed and the other two phases dealing with hypothermia and general surgery are not completed.

Dr. R. A. Gordon, J. H. Kerr, and Dr. R. Taylor of the Department of Pharmacology have been carrying out a clinical investigation of the local anaesthetic properties of d, 1-N-Methyl-pipecolic acid-2, 6 dimethylanilide-hydrochloride (Carbocaine). A preliminary report is in the press.

Dr. J. M. Kerr, supported by a National Health Grant, has undertaken an investigation of certain parameters of pulmonary mechanics and the progressive changes therein during normal and pre-eclamptic pregnancies, with and without anti-histamine administration. Dr. Kerr in co-operation with Dr. J. Low of the Department of Obstetrics has undertaken a study of epidural anaesthesia in obstetrics with a view to establishing the relationship, if any, between the level and onset of the anaesthesia and the status of foetal cord oxygenation of the newborn.

Dr. Brian M. Marshall in collaboration with the Department of Neurosurgery, Toronto General Hospital, is carrying out further investigation into hypothermia and anaesthesia under a National Health Grant.

Dr. Murray Mendelson under a Fellowship granted by the Abbott Research Laboratories has been carrying out a study of Respiratory function and requirements of patients in the Acute Respiratory Deficiency Treatment Unit at the Toronto General Hospital.

PUBLICATIONS

CONN, A. W. and JUNKIN, C. I. (with D. Allan). "Anaesthesia with Hypothermia for Closure of Atrial Septal Defects in Children" (*Canadian Anaesthetists' Society Journal*, vol. 6, no. 4, Oct., 1959, pp. 327–36).

——— "Cardiac Output Determinations in the Operating Room: A Microtechnique" (*ibid.*, vol. 6, no. 4, Oct., 1959, pp. 337–40).

——— "A Year of Paediatric Anaesthesia" (*ibid.*, vol. 6, no. 4, Oct., 1959, pp. 322–6).

CONN, A. W. and JUNKIN, C. I. "Anaesthesia for Ligation of Patent Ductus Arteriosus in Children" (*ibid.*, vol. 7, no. 2, April, 1960, pp. 125–33).

FAIRLEY, H. B. "The Selection of a Mechanical Ventilator" (*ibid.*, vol. 6, no. 3, July, 1959, pp. 219–26).

GORDON, R. A. and LUNDERVILLE, C. W. P. "Analgesic Properties of Anileridine, Meperidine and Morphine: A Comparative Study" (*ibid.*, vol. 7, no. 1, Jan., 1960, pp. 32–8).

GORDON, R. A. and LUNDERVILLE, C. W. P. (with Simonsen, L.). "Obstetrical Anaesthesia at the Toronto General Hospital" (*Canadian Medical Association Journal*, vol. 82, no. 11, March 12, 1960, pp. 571–4).

MATTHEWS, R. L. and NUNN, J. F. "Gaseous Exchange during Halothane Anaesthesia: The Steady Respiratory State" (*British Journal of Anaesthesia*, vol. 31, no. 8, Aug., 1959, pp. 330–40).

SMITH, C. "Routine Method of Managing Children with Foreign Bodies in the Air Passages" (*Anesthesia and Analgesia—Current Researches*, vol. 39, no. 1, Jan.-Feb., 1960, pp. 102–3).

VANDEWATER, S. L. and PAUL, W. M. "Observations on the Foetus during Experimental Hypothermia" (*Canadian Anaesthetists' Society Journal*, vol. 7, no. 1, Jan., 1960, pp. 44–51).

ANATOMY

Under the direction of Professor J. W. A. Duckworth

During the year 1959–60 there were 919 undergraduate and graduate students working in the Department of Anatomy. They were distributed among 33 different courses mentioned below, as follows:

UNDERGRADUATE COURSES IN GROSS ANATOMY AND NEURO-ANATOMY		
1. Medical, first year	160	
Art as Applied to Medicine	1	
Teachers' Course, Physical and Occupation Therapy	1	
2. Dental, first year	114	
3. Physical Anthropology, first year, Premedical	95	
4. Physical Anthropology, Honors, 3C	12	
5. Physical and Occupational Therapy, first year	73	
6. Physical and Occupational Therapy, second year	47	
7. Physical and Occupational Therapy, third year	56	
8. Physical and Health Education, second year	60	
9. Physical and Health Education, third year	38	
10. School of Embalming, first year	54	
11. School of Embalming, second year	30	
12. Dental Hygiene, first year	8	
13. Speech Pathology	8	
		757
GRADUATE COURSES IN GROSS ANATOMY		
14. Surgery	10	
15. Radiology	7	
16. Anaesthesia	13	
17. Neuro-Anatomy	17	
18. Obstetrics and Gynaecology	15	
19. Ophthalmology	4	
20. Oto-laryngology	9	
21. Dental Anatomy	6	
22. Physical Anthropology	3	
23. Demonstrators in Gross Anatomy	3	
24. Advanced Graduate Course in Surgery	26	
25. Advanced Graduate Course in Obstetrics and Gynaecology (Summer)	9	
26. School of Graduate Studies	4	
		106
UNDERGRADUATE COURSES IN HISTOLOGY		
27. Medical, first year (included in item 1)	160	
28. Dental, first year (included in item 2)	114	
29. Physical and Occupational Therapy, first year (included in item 5)	73	
	347	
GRADUATE COURSES IN HISTOLOGY AND CYTOLOGY		
30. Graduate Dental Histology	6	
31. Graduate Histology	8	
32. Special Cytology	1	
		15
EXTENSION COURSE		
33. Surgical Trade Technicians	41	
		41
TOTAL		919

During the year 1959–60 two additional courses were given by the department. In the Physical Anthropology section, a lecture and laboratory course of seventy hours was given to the students taking the Honours Course 3C in Anthropology. In the Department of University Extension, at the request of the Surgical Trade Association, a course of fifty hours in basic Anatomy with reference to the design of medical and surgical apparatus was given to the surgical trade technicians.

The Department will be sorry to lose two members of the Staff this year. Miss K. I. McMurrich is retiring after thirty-one years' service. Miss McMurrich played a prominent part in the organization and teaching of the course given to the Physical and Occupational Therapy students. Dr. D. L. J. Bilbey, who joined the Department in 1958, is leaving to take up the Readership in Anatomy in the University of London at King's College Medical School.

In April, 1960, Dr. P. H. Silver of the Middlesex Hospital Medical School visited the department and gave a lecture on his investigations *in ovo* of head morphogenesis in the chick, and Dr. J. Dankmeyer of the University of Leiden, Holland, gave a lecture on the structure of aortic coarctation in relation to the development of the ductus arteriosus.

During the year Dr. J. E. Anderson supervised the preparation of the Physical Anthropology issue of the University of Toronto Medical Journal. In April, 1960, Dr. D. L. J. Bilbey gave a paper and demonstration of segmental anatomy of the human liver to the Seventh International Congress of Anatomists in New York. In May, 1960, Dr. J. W. A. Duckworth gave two addresses to the Annual Meeting of the Ontario Society of Radiographers on the radiological aspects of congenital anomalies.

In December, 1959, Dr. M. C. Hall obtained the Fellowship of the Royal College of Surgeons of Canada with Certification in Orthopaedic Surgery.

In December, 1959, Dr. T. S. Leeson gave a paper to the Ontario Group of Electron Microscopists on the Electron Microscopy of the Developing Kidney. In April, 1960, he also gave a paper to the Seventh International Congress of Anatomists in New York on the Electron Microscopy of intertubular tissue in the hamster kidney.

During the year, Dr. C. G. Smith completed part 2 of his Neuro-anatomy text and also revised part 1; these were made available to the first-year medical students.

Research

In connection with his Physical Anthropological work, Dr. J. E. Anderson has carried out: (1) a study of the formation of the tympanic plate in young skulls, and the incidence of a central defect in its ossification. A high incidence of this defect was noted in the temporal bones of a prehistoric Iroquois population; (2) with Dr. L. Oschinsky of the National Museum of Canada, a comparative study of cranial variations; (3) completed the study of the skeletons from the Bosomworth site, noting in particular the skeletal pathology in evidence.

With the aid of a grant from the Banting Research Foundation, Dr. Sylvia H. Bensley has continued the microscopic studies of the connective tissue of the living transilluminated iris in mice, rats, and guinea pigs, and has investigated, particularly, various techniques for recording photographically and in permanent preparations the microscopically visible reactions of the living connective tissue to various inflammatory and antiphlogistic agents. Cinephotomicrography shows promise of recording vascular changes which take place in the iris.

Further studies of nuclear extensions of the nuclei of human blood neutrophilic leucocytes have been made on stained blood films from normal healthy individuals and from patients with various hereditary metabolic diseases. It was found that these extensions are Feulgen-positive and are therefore probably chromatin. It is difficult to find these extensions in immature cells where the chromatin of the nucleus is not condensed but loosely contained in the nucleus. In differential counts of the neutrophile leucocytes the percentage of those with nuclear extensions varied in the controls from 14 to 20 per cent. With the exception of Huntington's chorea the percentage of neutrophile leucocytes with nuclear extensions in patients with hereditary diseases varied from 40 to 60 per cent, the highest value being in a patient with haemophilia.

In collaboration with Miss Joyce V. Farmer of the Research Laboratory of the Ontario Hospital, microscopic studies have been carried out on the effects of repeated injections of histamine and female sex hormones on vaginal smears, various organs, and connective tissues of young adult rats. They found that the histamine in mast cells stimulated the pituitary and adrenal glands and produced toxic effects in the liver. The sex hormones abolished the estrus cycle, produced pseudo-pregnancy and protected the animals against many of the effects of histamine.

In collaboration with Dr. E. P. McDougall of the Hospital for Sick Children, histological studies have been made on the fate of sutured and unsutured autologous flexor tendon grafts in chickens. They found that both types of grafts not only survived but were reconstituted even in the absence of functional recovery.

Dr. D. L. J. Bilbey investigated the circulatory and biliary pathways of the liver in association with research on the distribution of elements of the reticulo-endothelial system. In the course of these investigations the gross anatomical features of both animal and human livers were studied and recorded.

The segmental anatomy of child and adult human livers was studied in 327 casts prepared by injection of variously coloured vinylite resin into the individual vessels and the subsequent digestion of liver tissue by hydrochloric acid. It was determined that the human liver may be divided into two vascular systems, one "portal" and the other "hepatic"; and that these systems interdigitate and are connected together by sinusoids. It was furthermore found that the portal distribution of vessels could be divided into discrete and constantly occurring segments, and that each segment received blood from a specific branch of the portal vein and of the hepatic artery and was drained by its own bile duct, these three systems of vessels forming a triad and following each other as parallel channels. A provisional nomenclature has been suggested for these various segments and for the fissures dividing them.

In association with Dr. Hjortsjo of Lund, Sweden, and Dr. Michels of Jefferson Medical College, it is proposed to present an agreed nomenclature to the International Anatomical Nomenclature Committee for inclusion in scientific and medical texts.

It was also seen that the hepatic system of veins was divided into segments, and these were associated with the various portal segments.

Dr. J. W. A. Duckworth has been investigating the course of the atrioventricular bundle and its branches in congenital ventricular septal defects and their relationships to the surgical repair of these defects.

Dr. M. C. Hall has continued his research in the field of connective tissues and has examined the water-binding power of the intercellular substances and the variations in this due to altered metabolic circumstances.

Dr. T. S. Leeson has been carrying out electron microscopic investigations on the development of the trachea and kidney in the rabbit and hamster, and has also been co-operating with Dr. H. Kalant of the Department of Pharmacology in a study of the intercellular "cement" in the liver and the effect of chelation on cell interfaces.

Dr. C. G. Smith has investigated the blood supply of the central nuclei of the cerebellum. His findings indicate that large branches reach these nuclei from the cortical branches of all three cerebellar arteries.

PUBLICATIONS

ANDERSON, J. E. "Defects in the Tympanic Plate" (Abstract) (*Anatomical Record*, vol. 136, no. 2, 1960, p. 308).

——— "Duodenum Inversum" (*Canadian Journal of Surgery*, vol. 3, April, 1960, pp. 262–3).

——— "A Laboratory Course in Physical Anthropology" (*Journal of Medical Education*, vol. 34, no. 10, pt. 1, 1959, pp. 997–9).

——— "Physical Anthropology: A Strange Wedding" (*University of Toronto Medical Journal*, vol. 37, no. 5, 1960, pp. 142–4).

——— Review, *Oral Health*, vol. 50, 1960, p. 255.

BILBEY, D. L. J. *et al.* "Assessment of the Phagocytic Activity of the Macrophage System" (*Nature*, vol. 184, suppl. 13, Sept. 26, 1959, pp. 992–3).

——— "Influence of Sulphur Dioxide Inhalation on the Phagocytic Activity of the Macrophage System" (*ibid.*, vol. 184, suppl. 10, Aug. 29, 1959, pp. 722–3).

HALL, M. C. "The Normal Movement at the Subtalar Joint" (*Canadian Journal of Surgery*, vol. 2, no. 3, 1959, pp. 287–90).

——— "Spinal Involvement in Gout" (*Journal of Bone and Joint Surgery*, vol. 42A, no. 2, 1960, pp. 341–3).

——— "Trabecular Patterns of the Normal Foot" (*Clinical Orthopaedics*, vol. 16, 1960, pp. 15–20).

HALL, M. C. and PENNAL, G. F. "Primary Subtalar Arthrodesis in the Treatment of Severe Fractures of the Calcaneum" (*Journal of Bone and Joint Surgery*, vol. 42B, no. 2, 1960, pp. 336–43).

LEESON, T. S. "Electron Microscope Studies of Newborn Hamster Kidney" (*Norelco Reporter*, vol. 7, nos. 1 and 2, Jan.-April, 1960, pp. 45–7).

——— "An Electron Microscopic Study of the Mesonephros and Metanephros of the Rabbit" (*American Journal of Anatomy*, vol. 105, no. 2, Sept., 1959, pp. 165–96).

——— "Electron Microscopy of the Developing Kidney: An Investigation into the Fine Structure of the Mesonephros and Metanephros of the Rabbit" (*Journal of Anatomy*, vol. 94, pt. 1, Jan., 1960, pp. 100–5).

——— "Electron Microscopy of Mummified Material" (*Stain Technology*, vol. 34, no. 6, Nov., 1959, pp. 317–9).

SMITH, C. G. and LINELL, E. A. "Microgyria" (*Neurology*, vol. 9, no. 10, Oct., 1959, pp. 689–93).

ART AS APPLIED TO MEDICINE

Under the direction of Miss Maria T. Wishart

The general work of the department has been similar to that of recent years.

It is with sincere regret that the resignations of Mrs. Louise Gordon, Instructor, and Mrs. Mary Murphy, Assistant Medical Artist and Instructor, are reported. Both contributed immeasurably to the success of the department and their loss is felt keenly.

Early in the year we found sufficient funds to permit the conversion of three small rooms into one large "workshop" suitable for the preparation of exhibit work, which requires considerable wall and table space. This alteration has proved a great asset.

The students in the course number three: two in the second year and one in the first year.

Miss Blackstock and Miss Wishart attended the Annual Meeting of the Association of Medical Illustrators, held in Seattle, Washington, last October. An outstanding feature of the meeting was the excellent closed circuit television demonstration of illustrative techniques.

BACTERIOLOGY

Under the direction of Professor Philip Greey

The undergraduate teaching has continued with minor modifications during the past year. Increased emphasis has been placed on teaching through small group discussions with members of the staff.

Mrs. Florence Kirkwood retired on June 30th of this year after seventeen years of association with the department. She will indeed be remembered for the efficient and kindly way in which she always carried out her duties.

RESEARCH

Dr. R. M. Price is continuing her interest in the prophylactic vaccination against tuberculosis, and the study of atypical strains of acid fast bacilli isolated from human sources.

Dr. G. H. Hawks, at St. Michael's Hospital, has conducted an extensive investigation of enteritis due to salmonella. He has also studied the absorption of phenoxyethyl penicillin and has found that the blood concentrations after oral administration are very satisfactory.

Dr. Marion Ross, at Sunnybrook Hospital, is investigating the value of hibitane for the preoperative preparation of skin, for topical application, and for bladder irrigation.

Dr. T. E. Roy, at the Hospital for Sick Children, has completed a very detailed study of all infections developing in patients in that hospital. He has also studied the effectiveness of an ethylene oxide gas sterilizer but has obtained unsatisfactory results.

Miss Joan Hennessy has continued attempts to isolate the agent of cat scratch disease in tissue culture using cell lines developed from lymph nodes of rabbits and monkeys. The results have been negative to date. She has also failed to confirm a report that the pus from cases of the disease contains haemagglutinins for rabbit red blood cells. With Dr. W. B. Garvock, Department of Therapeutics, the blood concentration following the oral administration of phenoxyethyl (synthetic) penicillin has been determined in a series of patients on different dosage schedules. The blood levels following the ingestion of this product have been very good. Only two patients with the malabsorption syndrome have been studied but in one erratic blood levels were obtained. A large series of strains of staphylococcus aureus of varying sensitivity to penicillin have been tested against the phenoxyethyl compound. Strains that produce penicillinase have been found to be from four to eight times more sensitive to synthetic penicillin than to penicillin G. In collaboration with Dr. J. M. Finlay, Department of Medicine, bacteriological studies have been conducted on patients attending the gastroenterological unit. A large number of tests have been done with an apparatus using ethylene oxide vapour for the sterilization of delicate instruments. Many factors affect the efficiency of this form of gaseous sterilization. The relative humidity inside the sterilizing chamber and the temperature of the vapour are apparently important as well as the nature of the object to be sterilized. In contrast to results with dry heat and steam under pressure, vegetative bacteria dried in saline or pus have been found to be more resistant to gaseous sterilization than bacterial spores.

Dr. A. E. Franklin has continued studies on the effects of hormones on virus propagation in tissue culture systems. HeLa cells have been grown in the presence of varying concentrations of prednisolone acetate suspension, prednisolone hemisuccinate solution and zinc-insulin for more than seven months. Poliovirus, type 1, has been titrated in each concentration of hormone at intervals during this time. Virus titrations in cultures with higher hormone levels have had a decreased virus titer. HeLa cells in the presence of prednisolone acetate have shown a slightly lower virus titer than cells in prednisolone hemisuccinate or insulin. Coxsackie virus, type B5, titrations in control and hormone cultures have not been significantly affected. Coxsackie virus, type A9, has been adapted to HeLa cells under several different conditions and preliminary observations suggest that the presence of prednisolone aids adaptation, whereas insulin is without any apparent effect. ECHO-9 virus has also been adapted to HeLa cells, but the presence of either prednisolone or insulin had no effect. Infectious hepatitis specimens have been subcultured with varying concentrations of prednisolone and insulin, but so far no evidence has been obtained to suggest the propagation of this agent under these conditions. Current investigations include a continuation of the study of HeLa cells in the presence of hormones for prolonged periods of time and determination of sensitivities at various intervals.

Drs. J. C. Sinclair and Marjorie Swanson have studied outbreaks of hepatitis at Petawawa, Sudbury, Whytehaven (Bowmanville), and Rossmore (Belleville area). Water-borne spread of the infectious hepatitis virus was proven responsible for an explosive outbreak of hepatitis in 69 of 143 children at the Ameliasburg School (Rossmore) in late February and early March. Dr. J. C. Sinclair and Miss B. K. Buchner, M.A., assisted by Miss Mona Snyder have continued their studies on the isolation of the agents of infectious hepatitis and serum hepatitis. An immunological approach to the problem, utilizing the fluorescent antibody technique in a series of well controlled infection experiments in the chicken embryo, has been attempted.

PUBLICATIONS

FRANKLIN, A. E. and SINCLAIR, J. C. "Tissue Culture Studies with Infectious Hepatitis Specimens" (*Canadian Journal of Microbiology*, vol. 5, no. 6, Dec., 1959, pp. 567–71).

GREEY, P. H. "Antibiotics 1960" (*Bulletin of the Hospital for Sick Children*, Toronto, vol. 9, no. 1, Jan., 1960, pp. 8–12).

——— "Epidemiological Study of Infectious Hepatitis in the Province of Ontario" (*Medical Services Journal*, vol. 15, no. 6, June, 1959, p. 413).

Roy, T. E. "Antibiotics 1960" (*Bulletin of the Hospital for Sick Children*, Toronto, vol. 9, no. 1, Jan., 1960, pp. 3–8).

BIOCHEMISTRY

Under the direction of Professor A. M. Wynne

During the past year 464 students, distributed as follows, received instruction in the department:

Faculty of Medicine, first medical year			149
Faculty of Dentistry, first dental year			115
second dental year			86
Faculty of Arts, third year, honour courses			44
fourth year, honour courses			6
School of Graduate Study			64
(*a*) Special Students		10	
(*b*) Major subject Biochemistry		12	
Candidates for Ph.D.	7		
Candidates for M.A.	5		
(*c*) From other departments		42	
Total			464

A change in the undergraduate teaching programme of the department has resulted from a decision of the Faculty of Dentistry, made after consultation with the staff in biochemistry, to transfer the lecture and laboratory courses in biochemistry from the second dental year to the first dental year. It was necessary, therefore, during the transitional academic session just ended to provide instruction for students in both years. Henceforth, however, students in the Faculty of Dentistry will complete their courses in biochemistry in the first dental year.

It has been felt for some time that the course in biochemistry in the first medical year would gain significance if at a few appropriate periods during the academic session the students were to have the opportunity to learn from members of the clinical staff something about clinical problems in relation to biochemical principles. A beginning in this direction has been made during the past two years. With the co-operation of Professor A. L. Chute of the Hospital for Sick Children, Dr. Robert Slater of the hospital staff has on two occasions introduced students in the first medical year to some clinical problems having a close relation to biochemical principles with which the students were to some extent familiar. These lectures, delivered by Dr. Slater in the lecture theatre of the hospital and illustrated by clinical cases, were received with the greatest enthusiasm. There is no doubt that an extension of this practice to other areas of study would arouse similar interest and would help the students to realize early in their training that biochemistry is an indispensable part of scientific medicine.

The Department collaborated again, in June, 1960, in a short course for medical graduates on clinical uses of radioisotopes, organized by the Division of Postgraduate Medical Education. Professor G. C. Butler and Dr. M. A. Packham were again among the instructors, and the facilities of the department were used for some of the experimental work.

As a Visiting Lecturer appointed by the School of Graduate Studies, Dr. C. B. Anfinsen, Director of the Laboratory of Cellular Physiology and Metabolism in the National Heart Institute, Bethesda, Md., delivered a lecture in the department on the subject "The study of structure-function relationships in proteins and its application to problems of evolution."

Three graduate students received postdoctoral fellowships: Dr. B. G. Lane to work with Professor F. W. Allen at the University of California; Dr. K. B. Freeman with Dr. Thomas S. Work at the National Institute for Medical Research, London, England; and Dr. K. A. Walsh with Professor Hans Neurath at the University of Washington, Seattle.

Professor G. E. Connell was invited to take part in the Gordon Research Conference on Proteins and Nucleic Acids in July, 1959. He presented a paper on "Human Haptoglobins."

The technical staff and laboratory attendants have continued to perform their many duties with admirable efficiency. It is hoped that the recent employment of an assistant for Mr. McClary and Mr. Clough in the undergraduate preparation laboratory will help to relieve them of a burden which has become increasingly heavy.

As a result of the programme of renovation begun a few years ago all research laboratories in the department, with one or two exceptions, have been modernized and refurnished, as have also three large undergraduate laboratories. In addition, some other improvements have been effected, among which is the provision of a newly furnished library and reading-room. Altogether, newly furnished laboratories have been provided having a total area of nearly 9,000 square feet, equivalent to that of 27 rooms 15 feet by 22 feet, the approximate dimensions of single units in the Medical Building.

It has been necessary to postpone other alterations and improvements because of lack of funds. One research laboratory which in its present form has housed a succession of workers over a period of many years is badly in need of rehabilitation, and four undergraduate laboratories whose active history covers an even longer period await similar treatment. It is earnestly hoped that funds will become available in the near future for the modernization of these laboratories. The cost of alterations is high, but the cost of providing similar accommodation in a new building would be many times greater.

Members of the department have again received generous grants in aid of research from the National Research Council of Canada and the National Cancer Institute of Canada. The National Research Council has provided funds, in the form of special grants, for the purchase of a Spinco Model E Ultracentrifuge and a Beckman Recording Spectrophotometer. Support in the form of scholarships awarded by the N.R.C. and the N.C.I.C. has been received by several graduate students working in the department.

The Head of the Department, who is retiring at the close of the academic year, would like to record his gratitude for the kindness and co-operation he has received during many years from his colleagues in the University and from the administrative officers of the University. He would like particularly to record his appreciation of the kind and helpful co-operation which he has invariably received during the past nine years as Head of the Department from the Dean of the Faculty of Medicine. He wishes especially to record his gratitude for the many years of happy association with members of the Department of Biochemistry.

Research

In Professor C. S. Hanes' laboratory investigations on several enzyme problems have been in progress. Dr. C. K. Harris concluded his studies on an ATP-dependent increase in amylase activity in a cell-free pancreas preparation; he showed that the increase in activity is due to the release of active enzyme from an inactive lipoprotein complex and not to *de novo* synthesis as had been suggested. Dr. M. A. Moscarello has continued his investigations on the Ehrlich ascites tumour cells and has developed a method for isolating their nuclei in a state of virtual freedom from cytoplasmic contamination. Enzymes in the nuclei acting upon polynucleotides are being characterized. Mr. T. E. Webb has continued and extended his studies on ribonucleic acid-peptidase complexes in kidney tissue. Mr. J. T. Wong has developed methods for isolating and estimating a number of basic amino compounds including spermine and spermidine and he has studied the distribution of these in different cellular fractions. Dr. Sampath Kumar, a postdoctoral fellow, is investigating the use of polypeptidases as tools for constitutional studies on proteins.

Mr. K. B. Freeman and Mr. B. G. Lane concluded their studies on ribonucleates and ribonucleases under Professor G. C. Butler's direction.

Professor B. F. Crocker and Dr. Albert Hercz have continued the investigation of the mechanism of the synthesis of enzyme-proteins in bacterial cells. They have obtained further evidence that the form in which the "inducer" is active in stimulating biosynthesis is not the same as the form in which it is supplied to the cells. Possible metabolic changes in the inducing substance suggested by this evidence are under investigation.

Studies on electrolyte movements in biological systems and on the relation of electrolytes to metabolic processes have continued in Professor J. Manery Fisher's laboratory. With the assistance of Mrs. E. Dryden, Dr. Fisher has continued the investigation of the effects of insulin in intact frog muscle. Mrs. L. E. McMurray (formerly Miss Hasner) has carried out further studies on the influence of nitrate on similar preparations of frog muscle. Using mitochondria isolated from pigeon breast muscle Mr. G. J. Marcus has studied rates of oxidation and phosphorylation as influenced by changes in the relative concentrations of sodium and potassium ions in the external medium. Mr. Y. Ma'tuk has continued the investigation of the influence of glucose on the maintenance of the normal electrolyte pattern in the isolated lens of the rabbit eye. Miss H. Mayoh's study of the nature of the sugar in frog plasma has led to the conclusion that the only simple sugar present is glucose. No other monosaccharide and no disaccharide could be detected. Seasonal changes in the concentration of plasma glucose and in the activities of certain liver enzymes were observed. Mr. Ian W. French has begun a study of the influence of aldosterone on movements of potassium and sodium in isolated tissue preparations.

Professor G. E. Connell has continued his investigations on haptoglobin, the haemoglobin-binding protein of blood plasma. In collaboration with Dr. O. Smithies of the Connaught Medical Research Laboratories he has studied some aspects of the chemical structure of human haptoglobins of different genetic types. From each of these a peptide fragment has been isolated which appears to embody the genetic specificity of the original haptoglobin. Structural studies on these peptides are being undertaken.

Two graduate students have continued their work under Dr. Connell's direction. Mr. R. W. Shaw has devised a simplified procedure for preparing human haptoglobin in greatly purified form. The method involves selective adsorption of haptoglobin by a substituted cellulose ion-exchanger. Dr. R. K. Murray has employed haemoglobin labelled with radioactive iron in a study of its fate in the intact animal after being injected intravenously (1) as free haemoglobin and (2) as the haemoglobin-haptoglobin complex.

Dr. M. A. Packham and Mr. A. F. Lewis have collaborated in an investigation of a crude lipid fraction obtained from Rh-positive red blood cells, which it is suspected may contain an "Rh hapten." Efforts are being made to prepare the active material in purified form and to develop a satisfactory method for its assay. Its clinical value is being investigated by a practising physician.

PUBLICATIONS

Crocker, B. F. "A Biochemist Looks at Evolution: Past and Future"; in *Evolution: Its Science and Doctrine*, ed. T. W. M. Cameron, Royal Society of Canada, Studia Varia Series, pp. 138–49. Toronto: University of Toronto Press. 1960.

Lane, B. G. and Butler, G. C. "The Isolation, Identification and Properties of Dinucleotides from Alkali Hydrolysates of Ribonucleic Acids" (*Canadian Journal of Biochemistry and Physiology*, vol. 37, no. 11, Nov., 1959, pp. 1329–50).

Manery, J. F. "Minerals in Non-osseus Connective Tissue (Including Blood, Lens and Cornea)"; in *Mineral Metabolism, an Advanced Treatise*, vol. I, ed. F. Bronner and C. R. Comar, pp. 551–608. New York: Academic Press Inc. 1960.

Murray, D. H. and Butler, G. C. "The Preparation of D-Ribose-1-C^{14}, D-Arabinose-1-C^{14}, and D-2-Deoxyribose-1-C^{14}" (*Canadian Journal of Chemistry*, vol. 37, no. 10, Oct., 1959, pp. 1776–81).

Murray, R. K. and Connell, G. E. "Elevation of Serum Haptoglobin in Rabbits in Response to Experimental Inflammation" (*Nature*, vol. 186, no. 4718, April 2, 1960, p. 86).

MURRAY, R. K., CONNELL, G. E. and PERT, J. H. "The Role of Extracorpuscular Haemoglobin" (*Federation Proceedings*, vol. 19, no. 1, March, 1960, p. 66).

NEELIN, J. M. and BUTLER, G. C. "The Fractionation of the Histones of Calf Thymus and Chicken Erythrocytes by Cation-exchange Chromatography with Sodium Salts" (*Canadian Journal of Biochemistry and Physiology*, vol. 37, no. 7, July, 1959, pp. 843–59).

SMILLIE, L. B. and MANERY, J. F. "Effect of External Potassium Concentrations, Insulin and Lactate on Frog Muscle Potassium and Respiratory Rate" (*American Journal of Physiology*, vol. 198, no. 1, Jan., 1960, pp. 67–77).

SMITHIES, O. and CONNELL, G. E. "Biochemical Aspects of the Inherited Variations in Human Serum Haptoglobins and Transferrins"; in *Ciba Foundation Symposium on Biochemistry of Human Genetics*, ed. G. E. Wolstenholme and C. M. O'Connor, pp. 178–89. London: J. and A. Churchill Ltd. 1959.

COMMITTEE ON EXPERIMENTAL RESEARCH

Chairman: Professor J. D. Hamilton
Supervisor: Dr. R. C. Ritchie

The past year was more active than anticipated in terms of the number of operations and experiments conducted in the research quarters of the Banting Institute. The increase over the years has been at the rate of about 10 per cent per year, but in the past year this was exceeded. The staff has worked hard under difficulties to provide good service, but again the necessity of holding animals from survival experiments has meant crowding. The demand for space for small animals has been even more pressing, and during part of last winter the store-room had to be used. Preliminary estimates of space requirements from each department have been obtained in anticipation of the addition of two floors to the College Street area and five floors to the east wing of the Banting Institute.

The commitee is fortunate in having obtained very recently the services of Dr. Harold Baer as Veterinarian, to take charge of the joint facilities, under the general supervision of Dr. R. C. Ritchie. Most of the difficulties during the past year were due to the lack of a veterinarian and head of the laboratory staff. Dr. Baer still lacks a technician to assist with the running of the operating rooms but despite inadequate help has already made a great improvement.

Efforts to obtain funds for an animal farm to be established at the Ontario Veterinary College failed, but the problem is increasing each year with the increase in research. It will become acute when the Banting Institute is enlarged, as the added space will be devoted almost entirely to research laboratories and to animal quarters, with a corresponding increase in the demand for optimum housing for animals from survival experiments. Other means of finding suitable accommodation for these animals is being investigated, as well as a better source of supply.

MEDICAL BIOPHYSICS

Under the direction of Professor A. W. Ham

During the year under review, instruction was given to undergraduate, graduate and postgraduate students as follows:

Undergraduate: Undergraduate instruction was given by non-clinical members of the Department of Medical Biophysics in other departments because many of them hold cross-appointments in these departments or were given special invitations.

Professor A. A. Axelrad gave two lectures in Histology. Professor Ham gave three lectures in Histology and, at the invitation of Professor Hamilton, two lectures in the course in Pathology. Professor A. F. Howatson delivered two lectures in Histology. Professor H. E. Johns gave one lecture per week on modern physics to the second year premedical students in the Department of Physics; he was also responsible for the lecture course given to the fourth year Physiology and Biochemistry students taking Physics 18. Professor E. A. McCulloch was again responsible for the course in Clinical Microscopy which was given to second year medical students and which entailed his giving 20 lectures and conducting an accompanying laboratory course. Professors Till and Whitmore each gave a tutorial of one hour per week to undergraduate students in Physics taking the Physics I course.

Graduate: Instruction was given by members of the Department in courses available to suitable students registered in the School of Graduate Studies. There were 10 graduate students in the department. Professor B. Cinader gave a course of seventeen lectures in Immunochemistry. Professor Ham gave approximately ten lectures and conducted ten laboratory periods in the graduate course in Radiobiology. Professor C. Helleiner gave thirteen lectures in the course on Structure and Function of Macromolecules. Professor J. W. Hunt gave twelve lectures in the same course. Professor Johns gave an advanced course in Radiation Physics. Dr. R. Sheinin gave three lectures in the course on Macromolecules. Professor L. Siminovitch and Dr. C. Fuerst gave a course on the Chemistry and Physics of Virus Action. This consisted of three weeks with daily lectures and laboratory work. Professor J. E. Till gave about two-thirds of the instruction in the graduate course on Radiobiology. Professor G. F. Whitmore delivered sixteen lectures in the course on Macromolecules.

Postgraduate: Instruction was given in the Postgraduate Section of the Faculty of Medicine. Dr. W. R. Bruce participated in the Diploma Course in Radiology giving one lecture and three hours laboratory per week in Medical Radiology Physics. Professor Ham gave one lecture to the postgraduate students. Professor Johns gave two lectures in the course on the "Clinical Uses of Radioactive Isotopes" and one lecture to the students taking the course in Obstetrics and Gynaecology. Professor McCulloch gave ten demonstrations in Haematology to postgraduate students. Professor Siminovitch gave four lectures to the students taking the diploma course in Bacteriology at the School of Hygiene. Dr. R. M. Taylor gave a lecture to the postgraduate course in Medicine. Professor Till also gave a lecture to the postgraduate course in Medicine.

Outside Lectures Delivered: Professor A. A. Axelrad delivered a lecture on "Malignant Tumour Induction by a Virus" at the Jewish General Hospital, Montreal, at its tenth anniversary in November, 1959, and one on "Tumour Induction in Hamsters by a Virus" at the University of Western Ontario, London, Ontario, in December, 1959. Professor W. R. Bruce presented a paper entitled "The Maximum Likelihood Method of Prediction as Evaluated with 2,876 cases of Carcinoma of the Cervix," at the Medical Physics Section of the Canadian Physical Society Meetings in Kingston in June, 1960. Professor B. Cinader delivered lectures on "Genetics of the Antibody Response" at Roswell Park Memorial Institute, Buffalo, in March 1960; on "Acquired Immunological Tolerance in the Goat" at the New York Academy of Sciences, New York, in February, 1960; on "Quelques Aspects de la Tolérance Immunologique à des Antigènes Définis" at the Institut Pasteur, Paris, in May, 1960; on "Antibodies to Bovine Ribonuclease" at the Immunochemical Workshop, Cold Spring Harbor, New York, in June, 1960; he also gave a seminar on "Recent Developments in the Study of Antibodies to Enzymes" in the Department of Molecular Biology at the Institut Pasteur, Paris, in May, 1960. Professor A. W. Ham delivered a lecture on "Recent Advances in Cancer Research" to the section of paediatrics of the Academy of Medicine in February, 1960. He also delivered the Canadian Cancer Society lecture at the annual meeting of the College of General Practice (Medicine) of Canada in Montreal in February, 1960, and the Canadian Cancer Society lecture at the University of British Columbia in March, 1960. In May, 1960 he lectured on the same topic to the Section of Internal Medicine at the Annual Meeting of the Ontario Medical Society in Toronto. Professor A. F. Howatson presented a paper on "Electron Microscope Study of a Variant of Polyoma Virus during Tumour Induction in Hamster

Kidney" at the annual meeting of the American Association for Cancer Research, held in Chicago in April, 1960. Professor J. W. Hunt delivered a lecture on "Primary Aspects of Radiation Damage as Studied by Electron Spin Resonance" to the Canadian Association of Physics, Medical Physics Division in June, 1960. Professor H. E. Johns presented papers on "Clinical Application of Cs^{137} in Radiotherapy" and "A Body Scanner for the Location of Radioactivity in a Patient," at the Ninth International Congress of Radiology, Munich, July, 1959. He also delivered a paper on "Dosimetry Problems in Radiotherapy" at the American Roentgen Ray Society, Lecture Course, at Cincinnati, Ohio, in September, 1959. He presented a paper on "Spectral Distributions within a Scattering Medium Produced by 250 KV X-rays," at the Radiation Research Society meeting, in San Francisco, California, in May, 1960. Also Professor Johns participated in a study group on "The Use of Radioisotope Teletherapy Units and Supervoltage Radiation in Radiotherapy" jointly convened by the International Atomic Energy Agency and the World Health Organization held in Vienna, Austria, in August, 1959, and delivered a paper on "Newer Radiotherapeutic Sources of Radiation and the Distributions which They Produce in Biological Materials" at the American Cancer Society meeting held in Madison, Wisconsin, June, 1960. Professor E. A. McCulloch participated in a discussion on "Viral Etiology of Cancer" at the medical section of the Hamilton Academy of Medicine, in Hamilton, May, 1960. He also presented a paper on "Carcinogenesis by Polyoma Virus *in vivo*," at the Fourth Canadian Cancer Conference at Honey Harbour, Ontario, June, 1960. Professor L. Siminovitch gave a lecture on "Virus Induction of Tumours" in the Department of Biology, Purdue University, Lafayette, Indiana, in January, 1960, and also a lecture on "Effects of Radiation on Mammalian Cells" in the Department of Radiology, Stanford University Medical School, Palo Alta, California, in February, 1960. He also presented a paper on "Virus Induction of Tumours in Hamsters" at a meeting on Quantitative Virology held at the University of California, Berkeley, California, in February, 1960. Dr. S. Dales presented a paper on "Fine Structure Changes Associated with the Growth of the Virus of Encephalomyocarditis (EMC) in Earle's L Cells Growing in Suspension" at the annual meeting of the Electron Microscope Society of America at Columbus, Ohio, in September, 1959. Professor J. E. Till presented a paper on "The Influence of X-rays on the Cell Cycle of Murine Cells in Tissue Culture" at the Ninth International Congress of Radiology held at Munich, in July, 1959. He also gave a paper on "The Radiation Sensitivity of Normal Mouse Bone Marrow Cells Determined by Quantitative Marrow Transplantation into Lethally-Irradiated Mice" at the Canadian Association of Radiologists held in Toronto, January, 1960, and a paper on "Radiation Survival Studies on Mammalian Cells" at the meeting of the Canadian Association of Physicists held in Kingston, Ontario, in June, 1960. Professor G. F. Whitmore gave a paper on "Some Effects of X-rays on Mammalian Cells in Tissue Culture" at the Ninth International Congress of Radiology held at Munich, July, 1959. He also presented a paper on "X-ray Effects on Mammalian Cells *in vitro*" at the Conference on Molecular and Radiobiology sponsored by the United States National Research Council, Ardsley-on-Hudson, December, 1959, and a paper on "Some Radiation Effects on Mammalian Cells in Tissue Culture" at the Carmel Conference on Experimental Advances in Radiotherapy, sponsored by the United States National Science Foundation and the National Research Council, at Carmel, California, in May, 1960. In addition, he gave a paper on "Cellular Aspects of Radiation" at the annual meeting of the Canadian Association of Physicists in Kingston, Ontario, June, 1960.

Addresses, teaching, and research by clinical members of the staff of the Department of Medical Biophysics are reported under "Radiology."

Research

The research described below is supported primarily by the Ontario Cancer Treatment and Research Foundation and by grants from the National Cancer

Institute of Canada. Subsidiary assistance is received from the Banting Research Foundation, Defence Research Board of Canada, Foster Bequest Fund of the University of Toronto, National Institutes of Health, United States, and the National Research Council of Canada by means of grants made to various individuals on the staff.

A joint project has been carried out by Professors Axelrad, Ham, Howatson, McCulloch, and Siminovitch on the polyoma virus. As described last year, the variant of this virus recovered in this laboratory when injected into newborn hamsters produces kidney tumours very rapidly so that many animals die within ten days. This rapid induction has permitted a day-to-day study to be made of the process of viral carcinogenesis. The first lesion is seen three to four days after virus is injected. It is confined to the mesenchymal cells of the kidney and these demonstrate both a necrotizing and proliferative response. In the necrotizing lesion margination of chromatin, and intra-nuclear and cytoplasmic inclusions are all observed. The necrotizing response reaches its peak about the sixth day and then disappears. Virus recovery experiments and electron microscopy show that the necrotizing response is associated with the production of virus. The proliferative response continues and emerges as a rapidly growing sarcoma, the cells of which demonstrate little or no virus. The two responses bear many similarities to the two responses that are observed in lysogenic systems of bacteria and the experiments show an example of how a tumour could be caused by a virus without a virus' being obvious in a fully developed tumour.

Professor Axelrad in addition to participating in the above work has been investigating the mechanism of the genetic change whereby normal cells are converted into leukemic cells by the Gross leukemia virus. The leukemia generally begins in the thymus and he has found evidence that the high susceptibility of suckling mice can be related to the rapid proliferation of thymic cells in these animals and the decrease in susceptibility with age to the decrease in growth rate of thymic cells.

Professor B. Cinader and Mr. B. G. Carter have explored the possibility of there being examples of failure in the induction of immunological tolerance. They have shown that erroneous conclusions in this respect are often based on impurities in the antigens that are employed and that, when all precautions are taken, the failures which have been thought to occur do not. Work on the formation of antibodies to enzymes has been continued with Dr. M. Branster; studies on the uptake of proteins by monocytes and on the mechanism of antibody formation have been pursued with Dr. Chou, and experiments are in progress with regard to the immunological treatment of Chorion Carcinoma.

An investigation was carried out by Dr. S. Dales and Dr. L. Siminovitch on the life cycle of vaccinia virus multiplying in Earle's L cells. Increase in virus titre over a one-step growth curve was correlated with morphological observations on virus formation and with the changes in the fine structure of the cells. Very early stages in the infectious process of virus adsorption and penetration into the cytoplasm were observed with the electron microscope for the first time.

A plaque technique has been developed for the measurement of murine encephalomyocarditis (EMC) virus in L cells by Dr. C. R. Fuerst. The development of EMC virus in L cells has been investigated. EMC virus has been partially purified and the ratio of infectious particles to total number of particles determined. This has been done by Dr. Fuerst in collaboration with Dr. S. Dales. Mutants of EMC virus have been isolated. These include mutants to heat resistance and various plaque-type mutants.

Dr. C. W. Helleiner has continued work on a study of the control of enzyme formation in strain L mouse cells grown *in vitro*. Examination of some enzymes involved in amino acid metabolism has so far revealed no example of enzyme induction or repression. Assay methods suitable for use with L-cells have now been developed for deoxyribonucleases and, with Mr. M. Gold, of deoxyribonucleate polymerase.

Dr. A. F. Howatson has made an electron microscope study of hamster kidney cells during tumour induction of polyoma virus which revealed many interesting manifestations of virus action on infected cells. Viral material was present in at least three forms—spherical particles of diameter of 40 mμ, spherical particles of diameter 60 mμ, probably consisting of the 40 mμ particles with an extra membrane and long filaments or tubules of diameter of 30 mμ. The first type of particle was by far the most numerous. The fine structure of the virus particles has been studied both in high resolution micrographs of the sections and by a negative-staining procedure. Other virus studies include investigation of the development of Rous virus in cells infected *in vitro* (in co-operation with Dr. R. Bather) and of the mode of production of mammary tumour virus. A search for possible viral agents in human tumours has been started also.

In addition to the polyoma studies already described, Professor E. A. McCulloch has studied mouse bone marrow cells by observing their growth in irradiated mice. It has been possible to quantitate the number of viable cells in a marrow suspension by observing marrow colonies in the spleen. This technique has allowed an accurate measurement of radiation sensitivity of mouse marrow cells. It has been used also in quantitative studies on the effect of marrow on thymic regeneration following whole-body radiation. He has made studies of the multiplication of the Gross leukemia virus. In collaboration with Dr. D. N. McLeod, a programme of investigations of human neoplasms has commenced. This work is still in its preliminary stages. Dr. McLeod has also made quantitative studies of polyoma virus grown *in vitro.*

In collaboration with Professor E. S. Goranson, studies on the influence of whole-body X-irradiation on the serum proteins in the $C3H_f$ mouse have been extended. Following exposure to X-ray doses in the lethal range the sera show an increased level of a component with the electrophoretic mobility of an alpha-globulin. This component has been identified chemically as a glycoprotein of the seromucoid type. Serum assays indicate a marked increase in the mucoprotein level following whole-body X-irradiation and a parallel but less striking elevation of the total serum glycoproteins. These changes are most pronounced in the first week after X-ray exposure, and in animals protected from irradiation death by the injection of isologous bone-marrow cells the changes persist for several months with a gradual return to normal levels.

In collaboration with Dr. J. M. M. Darte, Professor McCulloch is investigating the effects of whole-body irradiation followed by marrow transplantation in patients with leukemia.

Dr. R. Sheinin has been pursuing studies in the past year towards purifying the polyoma virus isolated in this laboratory. It has been possible to obtain extensive purification by chromatographic techniques and by precipitation with protamine sulphate. In addition, the method of plaque assay for the tumour virus has been developed to the point where it may now be employed for studies on the biochemical and physiological action of the virus.

In addition to collaborative studies described elsewhere, Professor L. Siminovitch has developed a plaque technique for quantitative studies of vaccinia virus multiplication in Earle's L strain fibroblasts. Effect of various physiological conditions on this assay technique have been determined. A detailed investigation of morphological development of the virus using the electron microscope has been made.

In connection with studies on turnover of macromolecules in L cells, a technique has been developed by Mr. F. Kahan for the isolation and measurement of small amounts of isotopically-labelled protein and nucleic acids.

Reported by Professor H. E. Johns

The research during the last year dealt with a continuation of the study of absorption and scattering of radiation by materials of low atomic number, for conditions of interest in radiotherapy. Absorbed dose was measured directly by means of a calorimeter and from this it was possible to determine the value for W, the energy required to produce an ion pair. This work, carried out by Dr. W. B. Reid, is being prepared for publication.

An extensive programme to determine the spectrum of scattered radiation within a scattering medium was worked out by Dr. L. D. Skarsgard. Two papers dealing with the method for correcting the spectra and the measured spectra have been prepared.

The total-body scanner, designed to detect small amounts of excess radioactivity in a patient, has been further developed. This work was carried out by Dr. J. Cederlund and Mr. A. D. Rotenberg.

Two new types of therapy equipment are being developed, one using caesium-137, the other using two sources of cobalt-60. Work on these projects is being carried out by Dr. J. R. Cunningham.

The absorption of radiation in soft tissue within bony cavities is being investigated by Mr. N. Aspin. To simulate this biological system, very fine glass capillaries, filled with unit density material, are being used. The dose in these cavities is being measured using T2 virus as the sensitive element. The effect of radiation quality on the energy absorbed in the soft tissue within the glass walls is being investigated.

The response of capillaries to acute local radiation is being investigated by Dr. W. R. Bruce by using the *in vivo* Clark-Sandison rabbit ear chamber and by measuring endothelial permeability as reflected in plasma transfer rates obtained with radioactive-labelled protein.

The "maximum-likelihood method" has been found to permit earlier and more efficient evaluation of survival data for a short period following treatment of carcinoma of the cervix. The technique, which we have found very easily adaptable to the University's IBM 650 computer, is being tested on a number of other tumour sites with an object of more efficient clinical experimental design.

The free-radicals produced by radiation in biological materials are being studied by Dr. J. W. Hunt in an attempt to learn more about the mechanism of damage.

A sensitive electron spin resonance spectrometer has been constructed to observe these free radicals, and is now in routine operation. The most interesting results have been on the radicals formed in irradiated crystalline ribonuclease, where information about the action of the protective agent, cysteine, has been obtained.

In co-operation with the Radiotherapy Department of the Princess Margaret Hospital, extensive clinical research has been carried out on the treatment of malignant lesions by interstitial implants of radioactive tantalum wire. Routines have been devised for the dosimetry and handling of these wires, and techniques have been developed to implant these wires according to the standard Patterson-Parker rules. Very good success has been obtained using the tantalum to treat lesions in the head and neck.

The cell cycle in normal, irradiated and virus-infected mammalian cells in tissue cultures has been investigated by Dr. J. E. Till, with Mr. C. P. Stanners, by means of the techniques of quantitative autoradiography. X-rays have been shown to cause a specific increase in the time interval between completion of deoxyribonucleic acid synthesis and the onset of cell division. This effect appears to be the basis for several phenomena observed in irradiated cells.

During the last year work has been continued by Dr. G. F. Whitmore in an attempt to delineate certain effects of radiation on the L strain of mouse fibroblast grown in tissue culture. These studies have largely been concerned with the effects of radiation on the growth cycle of the normal cell, with special reference to effects on DNA synthesis. In addition, work has commenced on a project involving the *in vitro* induction of malignant transformations in mammalian cells with the polyoma virus.

PUBLICATIONS

AXELRAD, A. A., MCCULLOCH, E. A., HOWATSON, A. F., HAM, A. W. and SIMINOVITCH, L. "Induction of Tumors in Syrian Hamsters by a Cytopathogenic Virus Derived from a C3H

Mouse Mammary Tumor" (*Journal of the National Cancer Institute,* vol. 24, no. 5, 1960, pp. 1095–112).

Barclay, W. R., Bruce, W. R. and Fahreid, Z. "A Simplified Rabbit Ear Chamber" (*Archives of Pathology,* vol. 68, no. 4, 1959, pp. 409–12).

Bruce, W. R. and Barclay, W. R. "The Suppression by Cortisone of the Acute Local Radiation Reaction in the Rabbit Ear" (*Radiation Research,* vol. 13, no. 1, July, 1960, pp. 168–84).

Carter, B. G. and Cinader, B. "Some Experiments on Acquired Immunological Tolerance in Goats" (*Annals of the New York Academy of Sciences,* vol. 87, 1960, pp. 363–81).

Dales, S. "A Study of the Fine Structure of Mammalian Somatic Chromosomes" (*Experimental Cell Research,* vol. 19, no. 3, 1960, pp. 577–90).

Fuerst, C. R. "Lysogeny" (*Proceedings of the Canadian Cancer Conference,* vol. 3, 1959, pp. 271–85).

Goranson, E. S. "A Simple Device for Transmission Densitometry" (*American Journal of Medical Technology,* vol. 25, no. 6, 1959, pp. 399–400).

Gwatkin, R. B. L. and Siminovitch, L. "Multiplication of Single Mammalian Cells in a Nonbicarbonate Medium" (*Proceedings of the Society of Experimental Biology and Medicine,* vol. 103, no. 4, 1960, pp. 718–21).

Ham, A. W. "Recent Advances Relating to Virus and Cancer" (*Annual Report of the Ontario Cancer Treatment and Research Foundation,* 1958–9, pp. 69–78).

Ham, A. W., McCulloch, E. A., Axelrad, A. A., Siminovitch, L. and Howatson, A. F. "The Histopathological Sequence in Viral Carcinogenesis in the Hamster Kidney" (*Journal of the National Cancer Institute,* vol. 24, no. 5, 1960, pp. 1113–29).

Howatson, A. F., McCulloch, E. A., Almeida, J. D., Siminovitch, L., Axelrad, A. A. and Ham, A. W. "Electron Microscope Study of a Variant of Polyoma Virus during Tumor Induction in Hamster Kidney" (*Proceedings of the American Association for Cancer Research,* vol. 3, 1960, p. 121).

——— "*In vitro, in vivo* and Electron Microscope Studies of a Virus Recovered from a C3H Mouse Mammary Tumor: Relationship to Polyoma Virus" (*Journal of the National Cancer Institute,* vol. 24, no. 5, 1960, pp. 1131–51).

Hunt, J. W., Gray, L. H. and Boag, J. W. "The Effect of Paramagnetic Gases on the Electron Spin Resonance Signal from Activated Charcoal" (*Radiation Research,* vol. 12, no. 4, 1960, pp. 319–24).

Johns, H. E. "Radiation Therapy: Rotation"; in *Medical Physics,* ed. Otto Glasser, pp. 515–24. Chicago: Year Book Publishers. 1960.

Johns, H. E. and Cederlund, J. F. "Basic Principles of Scintillation Counting"; in *Medical Radioisotope Scanning,* pp. 41–57. Vienna: International Atomic Energy Agency. 1959.

Johns, H. E. and Skarsgard, L. D. "Spent Radon Seeds: II, Radiation from Spent Radon Seeds" (*Radiology,* vol. 74, no. 3, 1960, pp. 403–6).

Rothfels, K. H., Axelrad, A. A., Siminovitch, L., McCulloch, E. A. and Parker, R. C. "The Origin of Altered Cell Lines from Mouse, Monkey, and Man, as Indicated by Chromosome and Transplantation Studies" (*Proceedings of the Canadian Cancer Conference,* vol. 3, 1959, pp. 189–214).

Siminovitch, L. and Axelrad, A. A. "Some Biological Problems in Cancer Biochemistry" (*Canadian Journal of Biochemistry and Physiology,* vol. 38, no. 4, 1960, pp. 425–33).

Stanners, C. P. and Till, J. E. "DNA Synthesis in Individual L Strain Mouse Cells" (*Biochimica & Biophysica Acta,* vol. 37, no. 3, 1960, pp. 406–19).

Stich, H. F., Wakonig, R. and Axelrad, A. A. "Chromosome Complement of Spontaneous Leukaemia in AKR Mice" (*Nature,* vol. 184, 1959, pp. 998–9).

Whitmore, G. F. "Radiation, Its Primary Interactions" (*Canadian Journal of Biochemistry and Physiology,* vol. 38, 1960, pp. 312–20).

Whitmore, G. F. and Johns, H. E. "A 250 Cs^{137} Teletherapy Unit with a 15 cm. Source to Skin Distance" (*British Journal of Radiology,* vol. 32, 1959, pp. 533–8).

MEDICINE

Under the Direction of Professor R. F. Farquharson

The requests of Drs. H. H. Hyland and E. J. Maltby for early retirement were received with great regret. The department is grateful to them both for faithful and talented services over the years. Dr. Hyland has made important contributions to many aspects of neurology and notably with regard to vascular lesions of the brain. In clinical investigation, teaching, and training of graduate students, his efforts have played a large part in the advancement of neurology in Canada. His broad interest in Medicine and in the welfare of the department will be greatly missed. Dr. Maltby will be remembered by students and interns as well as by the staff for his outstanding clinical judgment, his talent as a bedside teacher, his understanding consideration for patients and his kindness to them, his wide practical knowledge of medicine and of the natural course of diseases, and in particular his mastery in the study of disorders of the gastro-intestinal tract.

Our good wishes go with Dr. Donald C. Graham on his regretted resignation from the University to take on the important position of editor of the *Canadian Medical Association Journal.* He will discharge his new duties with the same painstaking care of detail, the same diligence and industry and the same honest enthusiasm which he has demonstrated in teaching and in study in his favourite field of the rheumatic disorders.

The resignation of Dr. R. A. Chambers was a great disappointment. He has a genuine interest in fundamental studies in neurology in which he has displayed unusual talent. He has given valuable service in the Respiratory Paralysis Unit at the Toronto General Hospital and in the training of graduate and undergraduate students where his broad grasp of neurology and medicine was used effectively.

The Department welcomes the appointment of Drs. Susan Lenkei and Arthur W. Chisholm at the Toronto Western Hospital and Drs. P. H. Melville and D. M. Forman at the Toronto General Hospital.

The change in status of the Wellesley Hospital to a separate hospital with its own Board of Trustees terminates a temporary but important phase in its history. When financial difficulties made necessary the change in its status ten years ago, a teaching service was begun at once under the direction of Dr. R. C. Dickson who, on his appointment as Professor of Medicine at Dalhousie University, was succeeded by Dr. A. H. Squires. From its inception this service has been highly regarded by students and interns and by all who have followed its development. At the same time, a Psychological Medicine Service was initiated on the second floor of the old building where it has functioned as a special care unit under the general direction of Dr. H. H. Hyland and with the active support of Professor Stokes. It has fulfilled a very useful function.

We are grateful to Professor Stokes for his continued interest and collaboration in the study of psychiatric and emotional disturbances of patients, teaching of students, and training of graduates on the wards of all our teaching hospitals. This collaboration is furthered by giving appointments in both departments to certain members of the staff. The greatest need in this field at the moment is the development of an adequate special care unit at the Toronto General Hospital to carry on and expand the work done at the Wellesley Division and to supplement the important work which must be continued on medical and other wards. In this further development of the psychiatric aspects of medical care at the Toronto General Hospital Dr. J. Allan Walters, Associate Professor in both Medicine and Psychiatry, is playing a leading role.

Dr. Walters gave a lecture on July 7, 1959, at the National Hospital, Queen Square, on "Homeostatic Disorder in the Neuroses and Psychoses."

Dr. Ramsay Gunton has just returned from a trip to Australia where, on the invitation of the organizing committee, he gave a number of lectures on the different aspects of cardiology before the Second Asian-Pacific Congress of Cardiology.

In the summer of 1959, the Head of the department, on the invitation of the Australian Postgraduate Federation in Medicine, gave a series of lectures, and bedside and theatre clinics in all the medical schools of Australia and in several other centres.

Finally, I should like to mention how pleased I am that Dr. K. J. R. Wightman is succeeding me in the Sir John and Lady Eaton Chair of Medicine. He has consistently demonstrated a brightness of mind and clarity of vision that has been the admiration of his associates since his student days. It is the good fortune of our school that he is a man of great integrity and scholarship, with a desire to help the whole University and advance medicine throughout the country. I shall miss my work as

Professor of Medicine but I am happy to leave the department in the hands of such an able successor, and I shall look forward with pleasure to the development of his plans for its great advancement.

Research

Arthritis and Connective Tissue Diseases

Dr. J. Wallace Graham carries on his general studies of the value and dangers of various therapeutic agents in treatment of patients with different rheumatic disorders.

Dr. M. A. Ogryzlo and his associates continue their active investigation of abnormal serum protein patterns in many diseases. In a continuing study of the efficacy of uricosuric agents in gouty patients, they have compared the effect of zoxazolamine (Flexin) with that of sulfinpyrazone (Anturan) and found sulfinpyrazone the more effective. This agent has proven an excellent remedy in treatment of gout without, to date, any important harmful side-effects. Drs. Ogryzlo and McCarthy have also made interesting observations on the renal mechanism for excretion of uric acid and the effect of fasting and different factors in diet. Studies of the diurnal variation in renal clearance of uric acid in gouty and non-gouty patients are also being made by Drs. Ogryzlo, Houpt, and Montgomery.

Dr. Hugh A. Smythe is beginning a study of the turn-over of uric acid in gouty and non-gouty patients, using C_{14}-labelled uric acid.

Dr. Donald C. Graham has published a report of five patients suffering from ankylosing spondylitis in whom fatal leukaemia developed following radiation therapy. Based on long-term observation of over one hundred patients, Dr. Graham also has published a comprehensive description of the clinical and radiological manifestations of ankylosing spondylitis.

Cardiovascular and Respiratory Disorders

The development of special Cardiovascular Units at the major teaching hospitals in recent years has led to careful consideration of more precise and accurate methods of diagnosis of lesions amenable to surgery and hence to better treatment. This constant study, with verification of diagnoses at operation and, in patients with unfavourable course, by post-mortem examination, associated with careful prolonged follow-up studies of the progress of all the patients operated on, leads to important advances in knowledge along a broad front. The follow-up of patients operated on for relief of mitral stenosis has been gratifying and complete. Dr. W. F. Greenwood with Dr. Watt of the Department of Obstetrics and Gynaecology and Dr. Bigelow of Surgery have made a special study of thirty patients who have had mitral commissurotomy during pregnancy. The study of patients with the post-commissurotomy syndrome is receiving increased attention. The essential nature of this important cause of post-operative morbidity is unknown and its recognition and treatment are unsatisfactory although its manifestations may be suppressed in part by administration of steroids and salicylates.

Studies in vector cardiography have been continued by Dr. Kerwin at the Toronto Western Hospital and Drs. Burton and Abramson at the Toronto General Hospital with reference to more accurate diagnosis of certain cases of cardiac infarction and the differentiation of ostium primum and ostium secundum septal defects.

Dr. R. W. Gunton continues investigation in the field of application of dye dilution technique to the study of various aspects of congenital and acquired heart disease. He is also carrying forward investigation by use of intracardiac phonocardiography begun by Dr. Feruglio. Drs. Gunton and Gorelick, using aortic catheterization by a method that does not require an operative incision and applying indicator dilution techniques, have been studying means of measuring coronary blood flow with interesting results, but as yet no exact quantitative method.

Dr. Murnaghan has been making observations on the effect of radiation of the heart muscle in patients with carcinoma of the breast or oesophagus treated by radiation therapy at the Princess Margaret Hospital. In co-operation with the Radioactive Isotope Laboratory at the Princess Margaret Hospital, he has been applying the method of Sivelius and Johnson for estimating coronary blood flow with the use of radioisotopes.

Dr. Fraser Mustard pursues vigorously his studies of the nature of atherosclerosis and the influence of various factors on its development. In this work he has collaborated with the Ontario Veterinary College at Guelph in long-term animal feeding experiments, using swine. He has observed the effect of diet and of ingestion of phosphatidyl serine and phosphatidyl ethanolamine on the anticoagulant activity of the blood and on the adhesiveness and survival of platelets. He has collaborated with Dr. Ogryzlo in a clinical and laboratory study of the relationship of gout to atherosclerosis.

Dr. J. A. Little of St. Michael's Hospital and Dr. Shanoff have also collaborated with Dr. Mustard in some aspects of their long-term clinical study of atherosclerosis and the influence of changes in phospholipid metabolism and other factors. In a large group of male veterans with coronary heart disease, the serum lipids were found to be definitely higher than in a control group but, as shown in collaboration with Dr. R. D. Roe and Dr. E. A. Murphy, the prognosis among survivors of myocardial infarction appears to bear no clear relationship to the serum cholesterol or other lipid concentration. Dr. Little is also observing, in a family with inherited lipid disturbances including hypercholesterolaemia, the progress of the disorder and the influence of dietary and other factors.

Drs. Moran, Wilson and Fields have been especially interested in the reasons for refractory heart failure in certain cases. They continue to compare the effectiveness of oral administration of different penicillins.

Drs. R. L. MacMillan, K. W. G. Brown and D. L. Watt have continued the study of prolonged anticoagulation therapy following myocardial infarction, using their modification of the one-stage prothrombin time done on capillary blood for regulation of dosage. They have been following also the effect of prolonged anticoagulation on the period of patency of recently inserted arterial grafts. They have tested carefully a commercial preparation of human fibrinolysin in treatment of patients with recent thromboembolic disorders. Finding no definite value from the therapy, they tested the preparation *in vitro* and found that it failed to dissolve a fibrin clot. It had very little kinase activity and, in the form supplied, proved to be an expensive preparation of dilute kinase.

Dr. F. M. Hill, who has been appointed Associate Chief of Medicine at the Women's College Hospital, continues her long-term studies of hypertension, pyelonephritis, and other renal diseases in pregnancy.

Dr. Colin Woolf has played a prominent role in a collaborative investigation of chronic bronchitis in different D.V.A. hospitals. He is evaluating a number of therapeutic measures in patients with this disorder. His studies of the nature of the dyspnoea of heart disease are being continued in the Respiratory Unit at the Toronto General Hospital. With Dr. Gunton and Dr. W. Paul (Pathological Chemistry) he has completed a study of cardiac output and blood volume in chronic cor pulmonale.

Dermatology

Dr. Murray G. Williams has been working at the Princess Margaret Hospital where, under the direction of Dr. Arthur Ham and using fluorescent antibody technique, he has been studying immunological mechanisms in ragweed sensitivity and in experimental work with the polyoma virus.

Drs. W. Linton, R. C. Smith and N. W. Wrong have been studying the effect of methyl prednisolone in a special sebum-like base in various dermatoses. While observing the effectiveness of griseofulvin in fungus diseases of the skin they used it unsuccessfully in treatment of a patient with sporotrichosis whose lesions later cleared on potassium iodide therapy in large dosage.

Gastroenterology

Dr. J. C. Sinclair has continued his investigation of infectious hepatitis. During the past few years sixteen outbreaks in widely scattered sections of Ontario have been studied. With colleagues in the Department of Bacteriology he has applied the fluorescent antibody technique in this problem.

The study of intestinal malabsorption in various disorders, using jejunal biopsies when appropriate, has been continued by Dr. J. M. Finlay. He has paid special attention to the postgastrectomy syndrome and to steatorrhoea in diabetics.

Dr. Paul O'Sullivan has noted in a series of patients with ulcerative colitis that administration of steroids by rectum is effective at a dosage which does not allow of enough absorption of the steroid to cause important side-effects. With Dr. C. Hetenyi, he has also been studying the malabsorption syndrome.

Dr. G. A. Gow has been following the progress of patients who have had haemorrhage from a duodenal ulcer.

Haematology

Much of the work on haematology is described in Dr. Wightman's report of the Department of Therapeutics.

Dr. Bardawill continues his studies of changes in numerous enzymes in the leucocytes and of fractionation of 17-ketosteroids and other steroid changes in patients with malignant diseases.

Dr. Dorothy Ley has nearly completed several aspects of her investigation of iron metabolism in patients with neoplastic disorders.

Dr. J. H. Crookston has been conducting a clinical and laboratory investigation of the mechanism of cell destruction in haemolytic anaemias and of the effects of therapy.

Metabolism and Endocrinology

Drs. J. C. Laidlaw, Mary Robertson, and J. L. Ruse have continued their studies in collaboration with Professor A. G. Gornall (Pathological Chemistry) of the relationship of progesterone and aldosterone metabolism in pregnancy. It would appear that the rise in aldosterone secretion and excretion during pregnancy is largely a consequence of increased progesterone secretion, and that the mechanism for the progesterone-induced rise may become less responsive with age. In association with Drs. Yendt and Gornall, they have studied two patients in whom the clinical and laboratory findings very closely resembled those found in primary aldosteronism. However, both patients were found to have a unilateral renal artery occlusion; removal of the affected kidney in one was followed by disappearance of all the abnormalities. It would appear that unilateral renal ischaemia may sometimes give rise to both hypertension and increased aldosterone secretion. In his series of forty-two patients with Cushing's syndrome, Dr. Laidlaw has found three patients with clinical or radiological evidence of a pituitary tumour. Following adrenalectomy, in two of twenty-nine cases, marked pigmentation developed associated with local manifestations of an expanding pituitary tumour; nine other patients became pigmented without any evidence of a pituitary tumour.

Drs. Ezrin and Sterns, with the collaboration of Dr. Laidlaw, have investigated the effect of experimental hypothalamic lesions on the diurnal variation of plasma hydrocortisone level.

Dr. Yendt and associates have continued the active study of renal hypertension. During the last year, however, his major interest has been centred on the renal handling of phosphate in normal and hyperparathyroid subjects. He feels that there are powerful homeostatic mechanisms other than the parathyroid hormone which regulate the behaviour of the renal tubule with respect to phosphate. Their work demonstrates the unreliability of so-called indices of parathyroid function which are based on any relationship between excreted phosphate and the filtered load. They have become interested also in the diurnal variation of urinary phosphate which occurs in normal subjects during a twenty-four hour fast. In three patients with adenomas of the parathyroid and associated overfunction this diurnal variation was lost. The underlying mechanism is being searched for. In the study of four adults with vitamin D refractory rickets they found the oral administration of large amounts of phosphate with vitamin D superior to administration of vitamin D alone. In observation of patients with renal calculi it became apparent that a large group had "idiopathic hypercalciuria." Further studies are being devoted to an elucidation of the nature of this disorder.

In collaboration with Professor Nicholson (Pathological Chemistry) Dr. Rapoport has made further observations on the transfer of electrolytes through the wall of the urinary bladder in dogs. In his further studies of differential renal clearance of sodium and other substances he has derived an index which may obviate the need for measurement of urine volumes during this test. He has completed his work on factors influencing the concentration of electrolytes and hydrogen ion in mixed human saliva.

In several hospitals, in collaboration with Professor Dauphinee and his staff, observations of the action of spirolactone, an antagonist of aldosterone, have been pursued in a variety of patients, including one with primary hyperaldosteronism (investigated by Dr. Higgins) and others with cirrhosis of the liver and various causes for ascites and oedema (investigated by Drs. Ezrin and Walfish, M. A. Ogryzlo, and P. O'Sullivan). In one patient with cirrhosis, studied by Drs. Dauphinee, Walfish, and Ezrin, a combination of therapeutic measures including spirolactone, prednisone, and chlorothiazide was successful when these agents used singly had failed. Similar results were found by Dr. Ogryzlo at Sunnybrook Hospital.

Drs. Duncan Gordon and F. M. Hill, working with Dr. Ezrin, have completed a review of one hundred cases of acromegaly, including a study of the pathological findings in a number of pituitary glands removed surgically and at autopsy. They have observed the effects of hypophysectomy in a number of patients with metastatic breast cancer operated on by Dr. Botterell. Dr. Ezrin had an opportunity to examine the cytology of three chromophobe adenomas which were associated with pigmentation following complete adrenalectomy for Cushing's syndrome. The tumours, two of them sent from the University of Ann Arbor, were composed of actively secreting, lightly granulated PAS-positive cells ("gamma cells").

Active work in problems of thyroid disease and thyroid function has been pursued at the three major teaching hospitals and at Sunnybrook and the Women's College Hospital. Dr. Higgins continues his examination of the 10-minute uptake of radioactive iodine, for which he was awarded both the Goldie Prize and the Reeve Prize in the past year. Dr. Sheppard has made observations on the chromatographic patterns of thyroid hormones in hyperthyroidism. Dr. Joan Vale has been studying the effect of small and increasing doses of thyroid on the radioactive iodine uptake of patients with normal glands and with non-toxic goitre. Drs. Johnson, Ezrin, and Volpé are completing the review of approximately six hundred patients with hyperthyroidism treated with radioiodine. It is interesting that some degree of definite hyperthyroidism, often with myxoedema, was found in approximately 15 per cent. There was great variation in the symptomatology. With Miss Amy Britton (Pathological Chemistry) and Dr. Walfish, they have evaluated the red cell incorporation of labelled triiodothyronine, a new test of thyroid function. They are studying the rate of degradation of I^{131}-labelled thyroxin in patients with thyroid disorders and patients receiving large doses of thyroid, the diurnal variation in plasma level of I^{131}-labelled thyroxin, and the rate of disappearance of I^{131}-thyroxin from the plasma of a patient with a periodic psychiatric disorder (with Dr. Melville).

Working with Dr. Ezrin, Drs. I. Broder, B. Langer, and E. E. Sterns have shown that the rise in basal metabolic rate which occurs in normal animals during partial adrenal cortical insufficiency does not occur in thyroidectomized animals maintained on thyroxine. With Dr. Allan Dyer (Connaught Medical Research Laboratories), Dr. Ezrin has been following the effect of surgical trauma and radiation on the urinary gonadotrophin excretion. Dr. Lax (Department of Medical Research) and Dr. Ezrin have studied transfer rates of various isotopes in patients with endocrine disease, chiefly in acromegaly and thyroid disorders. This new technique may prove of practical value in some clinical disorders. Dr. Peter Maloney (C.M.R.L.) continues to give great help in the problems of insulin resistance.

Dr. Barbara Hazlett has investigated the effect of long-continued administration of phenmetrazine hydrochloride (Preludin) in obese diabetics. Many patients refused to continue the treatment; in quite a number weight varied up and down while on the drug, with little net loss of weight; in several there was gradual weight reduction over a period of more than two years. The use of such drugs would appear to be a helpful means of reduction of weight in quite a number of those who take the tablets regularly over a long period.

Neurology and Miscellaneous

Drs. J. C. Richardson and William McIlroy, in collaboration with Dr. Botterell, have made a clinical review of seventy-five cases of syringomyelia with particular reference to the natural course of the disease and the results of surgical treatment.

Dr. H. J. M. Barnett and Dr. W. Lougheed (Surgery) have continued their study of patients suffering from carotid artery disease and their response to treatment. Drs. Barnett and R. S. McPhedran have been examining carefully and following the progress of patients with thrombosis of the main trunk of the middle cerebral artery demonstrated by arteriography.

Dr. R. Chambers and Dr. Fairley (Anaesthesia) have completed a study on the management of patients with respiratory insufficiency by use of intermittent positive pressure. Dr. B. Hazlett and Dr. Chambers have made an extensive investigation of diabetic neuritis. Dr. Chambers continues his interest in the relationship between lesions of the parietal lobe and abnormalities of behaviour.

Dr. Allan Walters has continued his interest in pain in general and psychogenic regional pain in particular, and has studied the use of imipramine in a variety of affective disorders.

Dr. W. B. Spaulding continues the examination of the presenting symptoms in two thousand consecutive new patients at the Medical Out-Patient Department of the Toronto General Hospital. With Dr. P. H. Melville, he has paid special attention to any relation between the country of origin of immigrants and their symptoms and the nature of their disorders, almost half the attending patients in 1958 having been born in continental Europe. It is interesting that emotional disorders were diagnosed as frequently in native-born Canadians as in Europeans. On the other hand, hyperthyroidism, for instance, was found more commonly in Europeans and Asiatics than in patients born in the British Isles and North America. The investigation continues.

PUBLICATIONS

ALDRIDGE, H. E. and GREENWOOD, W. F. "Myxoma of the Left Atrium" (*British Heart Journal*, vol. 22, no. 2, April, 1960, pp. 189–200).

BARNETT, H. J. M. and LOUGHEED, W. H. "Therapy in Carotid Artery Disease" (Abstract) (*Journal of Neurology, Neurosurgery and Psychiatry*, vol. 22, no. 4, Nov., 1959, p. 347).

BINGHAM, J. R. "Diets and Dyspepsia, Part I; Part II" (*Canadian Hospital*, vol. 37, no. 1, Jan., 1960, pp. 47, 86; no. 2, Feb., 1960, pp. 82–6).

——— "The Macrocytosis of Hepatic Disease. II, Thick Macrocytosis" (*Blood*, vol. 15, no. 2, Feb., 1960, pp. 244–54).

CHAMBERS, R. A. "Cerebral Anoxia" (*Bulletin of the Academy of Medicine, Toronto*, vol. 33, no. 5, Feb., 1960, pp. 82–3).

CROWTHER, T. A. "Adequate Treatment of Acute Chest Infections Will Do Much to Prevent the Development of Chronic Bronchitis" (*Health*, vol. 28, no. 1, Jan.–Feb., 1960, pp. 43–9).

EVANS, J. R. "Heart Disease" (*Medical Graduate*, vol. 5, no. 3, 1958–59, pp. 10–11).

Ezrin, C., Swanson, H. E., Humphrey, J. G., Dawson, J. W. and Hill, F. M. "Beta and Delta Cells of the Human Adenohypophysis: Their Response to Adrenocortical Disorders" (*Journal of Clinical Endocrinology and Metabolism*, vol. 19, no. 6, June, 1959, pp. 621–31).

——— "Cells of the Human Adenohypophysis in Thyroid Disorders" (*ibid.*, vol. 19, no. 8, Aug., 1959, pp. 958–66).

Ezrin, C. and Moloney, P. J. "Resistance to Insulin due to Neutralizing Antibodies" (*Journal of Clinical Endocrinology and Metabolism*, vol. 19, no. 9, Sept., 1959, pp. 1055–68).

Farquharson, R. F. "Value of Participation in Research in Continuing Education of the Practising Doctor" (*British Medical Journal*, vol. 2, no. 5148, Sept. 5, 1959, pp. 334–6, and *Journal of the American Medical Association*, vol. 171, no. 1, Sept. 5, 1959, pp. 26–9).

Feruglio, G. "Intracardiac Phonocardiography: A Valuable Diagnostic Technique in Congenital and Acquired Heart Disease" (*American Heart Journal*, vol. 58, no. 6, Dec., 1959, pp. 827–48).

Feruglio, G. A., Bayley, A. and Greenwood, W. F. "Non-penetrating Chest Injury Resulting in Isolated Rupture of the Ventricular Septum and Angina Pectoris" (*Canadian Medical Association Journal*, vol. 82, no. 5, Jan. 30, 1960, pp. 261–5).

Feruglio, G. A. and Gunton, R. W. "Intracardiac Phonocardiography in Ventricular Septal Defect" (*Circulation*, vol. 21, no. 1, Jan., 1960, pp. 49–58).

Feruglio, G. A., Gunton, R. W. and Heimbecker, R. O. "Electrocardiographic Observations in 300 Transthoracic Left Heart Catheterizations" (*American Heart Journal*, vol. 59, no. 2, Feb., 1960, pp. 238–48).

Feruglio, G. A. and Sreenivasan, A. "Intracardiac Phonocardiogram in Thirty Cases of Atrial Septal Defect" (*Circulation*, vol. 20, no. 6, Dec., 1959, pp. 1087–94).

Graham, D. C. "Ankylosing Spondylitis" (*Canadian Medical Association Journal*, vol. 82, no. 13, March 26, 1960, pp. 671–9).

——— "Leukaemia Following X-ray Therapy for Ankylosing Spondylitis" (*Archives of Internal Medicine*, vol. 105, no. 1, Jan., 1960, pp. 51–9).

——— "Rheumatism and Arthritis" (*Annals of Internal Medicine*, vol. 50, no. 2, Feb., 1959, pp. 366–494; March, 1959, pp. 633–787).

Graham, J. W. "The Fibrositis Syndrome"; in *A Textbook of Medicine*, ed. R. L. Cecil and R. F. Loeb, pp. 1357–60. Philadelphia: W. B. Saunders Co. 1959.

——— "Is Rheumatoid Spondylitis a Separate Entity?" (*Arthritis and Rheumatism*, vol. 3, no. 1, Feb., 1960, pp. 88–90).

——— "Phenylbutazone in the Treatment of Rheumatic and Other Painful Disorders" (*Bulletin of the College of General Practice*, vol. 6, no. 5, Nov., 1959, pp. 43–5).

——— "The Status of G-27202 (Metabolite 1 of Phenylbutazone) in the Treatment of Rheumatic Disorders" (*Canadian Medical Association Journal*, vol. 82, no. 20, May 14, 1960, pp. 1005–8).

Gray, C. C. "Respiratory Diseases and the General Medical Practitioner" (*Proceedings of the Annual Meeting, Medical Advisory Section, Ontario Tuberculosis Association*, Oct. 29, 1959, pp. 1–5).

Greenwood, W. F., Cooper, W. E. and Bayley, T. A. "Adams-Stokes Attacks due to Atrial and Ventricular Arrest, Treated by Vagotomy" (*Circulation*, vol. 21, no. 6, June, 1960, pp. 1140–46).

Hyland, H. H. "Modern Experience in Bacterial Meningitis" (*Canadian Medical Association Journal*, vol. 81, no. 11, Dec. 1, 1959, pp. 883–5).

Kerwin, A. J., McLean, R. and Tegelaar, H. "A Method for the Accurate Placement of Chest Electrodes in the Taking of Serial Electrocardiographic Tracings" (*Canadian Medical Association Journal*, vol. 82, no. 5, Jan. 30, 1960, pp. 259–61).

Lenczner, M. and Owen, T. "The Impact of Tropical and Parasitic Diseases in a Non-Endemic Area" (*Canadian Medical Association Journal*, vol. 82, no. 10, April 16, 1960, pp. 805–12).

Lenkei, S. C., Swan, H. J. C. and DuShane, J. W. "Transposition of the Great Vessels with Atrial Septal Defect" (*Circulation*, vol. 20, no. 5, Nov., 1959, pp. 842–9).

Macdonald, R. I. "Canadian Milestones in Clinical Medicine" (*Bulletin of Medical Library Association*, vol. 48, no. 1, Jan., 1960, pp. 27–32).

——— "Postgraduate Education in Medicine at the University of Toronto" (*Medical Graduate*, vol. 5, no. 3, 1958–59, pp. 6–8).

MacMillan, R. L. "Out-Patient Anticoagulant Therapy" (*Modern Medicine of Canada*, vol. 15, no. 2, Feb., 1960, pp. 87–91).

MacMillan, R. L., Brown, K. W. G. and Watt, D. L. "Prothrombin Time of Capillary Blood for Outpatient Anticoagulant Therapy" (*American Journal of Medical Sciences*, vol. 238, no. 4, Oct., 1959, pp. 443–7).

Mustard, J. F. "Lipids, Blood Coagulation and Atherosclerosis" (*Manitoba Medical Review*, vol. 40, no. 2, Feb., 1960, pp. 21–4).

Ogryzlo, M. A. and Franklin, E. C. "The Sixth Interim Scientific Session of the American Rheumatism Association: Review of Thirty-four Papers" (*Bulletin on Rheumatic Diseases*, vol. 10, no. 6, Feb., 1960, pp. 207–10).

Ogryzlo, M. A., Maclachlan, M., Dauphinee, J. A. and Fletcher, A. A. "The Serum Protein in Health and Disease: Filter Paper Electrophoresis" (*American Journal of Medicine*, vol. 27, no. 4, Oct., 1959, pp. 596–616; *Medical Services Journal*, vol. 16, no. 3, March, 1960, pp. 208–38).

Owen, T. "Recent Advances in Diagnosis" (*Medical Graduate*, vol. 5, no. 3, 1958–59, pp. 9–10).

Paterson, J. F. *Silicosis in Hardrock Miners in Ontario*. Bulletin 158, Ontario Department of Mines. Toronto: Queen's Printer. 1959. Pp. 47.

Rapoport, A., Evans, B. M. and Wong, H. "Some Short-term Metabolic Effects of Chlorothiazide in Hypertensives on a Rice Diet" (*Canadian Medical Association Journal*, vol. 81, no. 12, Dec. 15, 1959, pp. 984–90).

Rapoport, A., Nicholson, T. F. and Yendt, E. R. "Movement of Electrolytes across the Wall of the Urinary Bladder in Dogs" (*American Journal of Physiology*, vol. 198, no. 1, Jan., 1960, pp. 191–4).

Rapoport, A., Sepp, A. H. and Brown, W. H. "Carcinoma of the Parathyroid Gland with Pulmonary Metastases and Cardiac Death" (*American Journal of Medicine*, vol. 28, no. 3, March, 1960, pp. 443–52).

Richardson, J. C. "Pitfalls in Diagnosis and Treatment of Cerebral Arterial Insufficiency" (*Canadian Medical Association Journal*, vol. 82, no. 6, Feb. 6, 1960, pp. 298–305).

Richardson, J. C., Chambers, R. A. and Heywood, P. M. "Encephalopathies of Anoxia and Hypoglycaemia" (*Archives of Neurology*, vol. 1, no. 2, Aug., 1959, pp. 178–90).

Robertson, M. E., Stiefel, M. and Laidlaw, J. C. "The Influence of Estrogen on the Secretion, Disposition and Biologic Activity of Cortisol" (*Journal of Clinical Endocrinology and Metabolism*, vol. 19, no. 11, Nov., 1959, pp. 1381–98).

Schatz, D. L. and Volpé, R. "Lack of Diurnal Variation in the Level of Serum Protein-bound Iodine" (*Journal of Clinical Endocrinology and Metabolism*, vol. 19, no. 11, Nov., 1959, pp. 1495–7).

Spaulding, W. B. "Occupational Factors in General Morbidity" (*Ontario Medical Review*, vol. 27, no. 5, May, 1960, pp. 475–9, 514).

Spaulding, W. B. and Hennessy, J. N. "Cat Scratch Disease: A Study of Eighty-three Cases" (*American Journal of Medicine*, vol. 28, no. 4, April, 1960, pp. 504–9).

Taylor, R. M. "Radiation—The Problem of Our Times" (*Canadian Cancer Society Newsletter*, vol. 12, nos. 4–5, April-May, 1959).

Volpé, R. "Subacute Thyroiditis" (*Medical Graduate*, vol. 5, no. 3, 1958–59, pp. 11–12).

Volpé, R., Vale, J. and Johnston, M. W. "Effects of Certain Physical and Emotional Tensions and Strains on Fluctuations in the Level of Serum PBI" (*Journal of Clinical Endocrinology and Metabolism*, vol. 20, no. 3, March, 1960, pp. 415–28).

Walters, A. "Psychogenic Regional Pain Alias 'Hysterical' Pain" (Abstract) (*Journal of Neurology, Neurosurgery and Psychiatry*, vol. 22, no. 4, Nov., 1959, pp. 343–4).

Warwick, O. H. "Fever of Unknown Origin" (*Medical Graduate*, vol. 5, no. 3, 1958–59, p. 12).

Woolf, C. R. "The Diagnosis of Emphysema: A Physical Sign, a Roentgenographic Sign, and an Oximeter Test" (*American Review of Respiratory Diseases*, vol. 80, no. 5, Nov., 1959, pp. 705–15).

Wrong, N. M. "Dermatological Problems in Private Practice" (*Modern Medicine of Canada*, vol. 14, no. 4, April, 1959, pp. 103–13).

Wrong, N. M., Rosset, M., Hudson, A. L. and Rogers, S. "Griseofulvin in the Treatment of Superficial Fungous Infections" (*Canadian Medical Association Journal*, vol. 81, no. 3, Aug. 1, 1959, pp. 167–73).

Yendt, E. R., Kerr, W. K., Wilson, D. R. and Jaworski, Z. F. "The Diagnosis and Treatment of Renal Hypertension with Special Reference to a Case of Hypertension due to Stenosis of Both Renal Arteries" (*American Journal of Medicine*, vol. 28, no. 2, Feb., 1960, pp. 159–87).

OBSTETRICS AND GYNAECOLOGY

Under the direction of Professor D. E. Cannell

There have been few changes in the undergraduate and postgraduate teaching programmes in the past year. Certain modifications in the methods of undergraduate teaching have been made in both the third and final years, but it has not yet been possible to evaluate them.

The preceptor type of fourth-year teaching which was introduced at the Women's College Hospital in the past year has proven highly successful. It is planned to extend this to other teaching hospitals if satisfactory arrangements can be made to do so.

The Department was honoured by visits from Dr. H. B. Atlee, Professor of Obstetrics and Gynaecology, Dalhousie University, Halifax, Nova Scotia; Mr. Stanley Way, Newcastle on Tyne, England; Professor Dirk Crichton, Durban, South Africa, and Mr. W. P. G. Dickson, Lancaster, England.

The Department entertained The New Jersey Obstetrical and Gynecological Travel Club, The Obstetrical and Gynecological Travel Club, and the Canadian Gynaecological Travel Society for clinical and scientific meetings. The last named society celebrated its twenty-fifth anniversary here under the presidency of Dr. Leslie Watt.

Members of the staff contributed to the proceedings of local, provincial, national, and international societies during the year. In the course of these activities, the department was represented at meetings from the Atlantic to the Pacific.

The Department was most fortunate to have Mr. W. R. Winterton with us for four weeks as exchange professor from Middlesex Hospital, London, England. In the course of his visit, he made substantial contributions to our teaching programme, at both undergraduate and postgraduate levels. It was felt that both the department and Middlesex Hospital gained by this exchange.

Two former members of our staff have become heads of departments at other universities: Dr. F. E. Bryans at the University of British Columbia, Vancouver, B.C., and Dr. Wm. G. McGanity at the University of Texas Medical Branch School of Medicine, Galveston, Texas.

Hospital insurance in Ontario has now been in effect for over one year. At the present time, one cannot discern any adverse effect upon clinical teaching at the Toronto General Hospital in our department. There has been a significant decrease in the number of patients admitted to some of the other University units. It is to be hoped that this is a temporary occurrence rather than a permanent change.

The Head of the Department wishes to express his gratitude to his colleagues in the Department, Faculty, and University for their co-operation and assistance during the past year.

Research

Members of the staff have undertaken the following research work:

Dr. John Harkins and associates have completed the investigation of Levallorphan tartrate combined with Pethidine in patients in labour, carried out in conjunction with the Department of Anaesthesia. The results of the double blind study failed to reveal a significant difference in patients who received this medication as compared to those receiving Pethidine alone. Currently, an investigation is being carried out with the use of Dimenhydrinate in patients in labour. It is anticipated that this study will be completed by the end of June, 1960.

Dr. J. A. Low and associates are continuing their work in regard to oxygen and metabolic studies of the newborn infant in relation to normal and abnormal obstetric problems. The first phase of the study on haematological patterns and plasma and blood volumes has been completed and the remainder of the programme is being continued. Studies on bladder function and control are proceeding with the initial phases of investigation of normal anatomy of the urethra having been completed and the clinic for the investigation of disturbances of bladder control has been well established.

Dr. W. M. Paul, Dominion Stores Fellow, attended the Yale Workshop on Reproductive Physiology during the latter part of February. Experimental observations on amniotic fluid during uterine ischemia have been conducted, with the main experimental animal being the rabbit. The chief chemical areas explored were the products of anaerobic glycolysis, presumably appearing secondary to uterine ischemia. It is hoped that experience gained in the past year, using animal preparations, might begin to be applied to human amniotic fluid during the fall of 1960. These investigations have been conducted in the Coutts laboratory at the Toronto Western Hospital.

Dr. Crawford Shier's studies on the value of exfoliative cytology in prognosis of patients with carcinoma of the cervix have been completed and results were reported at the meeting of the Society of Obstetricians and Gynaecologists of Canada in June, 1960.

PUBLICATIONS

CANNELL, D. E. "Subarachnoid Haemorrhage in Pregnancy" (*Proceedings of the Royal Society of Medicine*, vol. 52, no. 11, Nov., 1959, pp. 950–2) (Section of Obstetrics and Gynaecology, pp. 30–2).

LOW, JAMES A. "Fetal Oxygenation in Normal Obstetric Patients" (*Obstetrics and Gynecology*, vol. 13, no. 6, June, 1959, pp. 695–700).

——— "Investigation of Urinary Incontinence in the Female" (*Ontario Medical Review*, vol. 26, no. 12, Dec., 1959, pp. 1157–64, 1214).

LOW, J. A., SPIVAK, M. M. and KAPSOS, J. E. "Bilirubin Activity in the Initial Neonatal Period" (*Canadian Medical Association Journal*, vol. 82, Jan. 16, 1960, pp. 136–9).

——— "Circulatory Adjustments in the Initial Neonatal Period" (*ibid.*, vol. 82, Jan. 9, 1960, pp. 70–2).

——— "Haematological Patterns in the Initial Neonatal Period" (*ibid.*, vol. 82, Jan. 2, 1960, pp. 12–16).

PAUL, W. M. and VANDEWATER, S. L. "Observations on the Foetus during Experimental Hypothermia" (*Canadian Anaesthetists' Society Journal*, vol. 7, no. 1, Jan., 1960, pp. 44–51).

OPHTHALMOLOGY

Under the direction of Professor A. J. Elliot

The postgraduate programme in ophthalmology was actively continued in 1959–60 and fifteen postgraduate students were registered in the department. Dr. Elizabeth Brodie, Toronto, and Dr. R. R. Toews, Niagara Falls, were appointed Canadian National Institute for the Blind Fellows. At the end of six months Dr. Brodie resigned owing to family commitments and Dr. H. P. Brent, Toronto, was appointed.

The undergraduate teaching programme continued as before with the emphasis in the third year on bedside clinics in ophthalmoscopy.

An R. Samuel McLaughlin Travelling Fellowship was awarded to Dr. C. B. Mortimer, who proposes to spend fourteen months in Great Britain, the Continent, and in American centres studying retinal detachment surgery.

V. Everett Kinsey, Ph.D., of the Kresge Eye Institute, Detroit, was Guest of Honour at the Departmental Research Meeting, under the direction of Dr. P. K. Basu, held in April. Eighteen members of staff contributed singly or jointly in twelve papers covering their fields of research.

During April an Eye Surgery Refresher Course was held in which all members of the staff participated. The guest surgeons were Dr. R. J. Brockhurst, Boston, Mass., Dr. Graham Clark, New York, N.Y., and Dr. H. Saul Sugar, Detroit, Mich. The course lasted three days and was a marked success.

The second Walter W. Wright lecture was given in October by Dr. Frank B. Walsh, Associate Professor of Ophthalmology, Johns Hopkins Hospital, Baltimore, Maryland.

An important milestone in the development of the department was the appointment of Dr. P. K. Basu as Stapells Director of Ophthalmic Research. This was made possible through the generosity of Mr. H. G. Stapells, Q.C., of Toronto, Ont. The object of the Stapells fund is to further ophthalmic research work in the department. Dr. Basu will direct and co-ordinate the research as well as carry on active work himself towards the prevention and treatment of diseases of the eye.

The department received visits from Mr. R. C. Davenport, F.R.C.S., and Mr. Frederick Ridley, F.R.C.S., London, England, and also Professor Jules François, Ghent, Belgium; all of whom gave excellent lectures to the staff and postgraduate students on ophthalmological subjects.

In addition to lectures given within the University, members of staff have given papers at meetings outside Toronto: Dr. A. J. Elliot spoke at the conjoint meeting of the British Medical Association and the Canadian Medical Association, Edinburgh, and also at the American College of Surgeons, Montreal, Que.; Dr. H. M. Macrae was on a panel discussion at the Spring Seminar of the New York Eye and Ear Infirmary in New York City; Dr. R. G. C. Kelly spoke at the Canadian Ophthalmological Society Meeting at Niagara Falls and attended the Pan-American Congress of Ophthalmology in Caracas, Venezuela; Dr. J. C. McCulloch took part in the Canadian Ophthalmological Society Research Meeting at Niagara Falls and spoke at the Muskoka Medical Society, the Association for Research in Ophthalmology at Ann Arbor, Michigan, and at the Montreal Ophthalmological Society.

Dr. P. K. Basu attended the Twenty-ninth Annual Meeting of the Association for Research in Ophthalmology, at Miami, Florida; Dr. J. C. Hill took part in the meeting of the American Academy of Ophthalmology and Otolaryngology, Chicago; Dr. J. S. Crawford was moderator of the Strabismus Symposium at the Canadian Ophthalmological Society Meeting at Niagara Falls and took part in the meeting of the American Academy of Ophthalmology and Otolaryngology, Chicago; Dr. W. P. Callahan and Dr. L. A. Lloyd also spoke at the Canadian Ophthalmological Society Meeting at Niagara Falls. Dr. H. R. Hausler spoke at the Association for Research in Ophthalmology at Ann Arbor and at the Neurology Field Investigations Study Section of the National Institutes of Health in the United States at Haddonfield, New Jersey.

Dr. M. Shea spoke at the Canadian Ophthalmological Society Meeting at Niagara Falls and at the Pan American Congress of Ophthalmology in Mexico City and at the Canadian Ophthalmological Society Meeting at Jasper Park, Alberta; Drs. J. S. Speakman and T. M. Sibay took part in the meeting of the Association for Research in Ophthalmology at Ann Arbor, Mich.; Drs. R. T. Collyer and G. S. Harris spoke at the Canadian Ophthalmological Society Meeting at Niagara Falls and Dr. C. B. Mortimer at the Canadian Ophthalmological Society Meeting at Jasper Park, Alberta; Dr. Nina Morley participated in the research meeting of the Canadian Ophthalmological Society at Niagara Falls and was an official delegate to the Fifth Conference on Ophthalmic Biochemistry held in the Massachusetts Institute of Technology.

Dr. D'Arcy Macdonald spoke on "Low Vision Aids" at the Canadian National Institute for the Blind and also at the Medical Alumni Association. He was interviewed on the use of low vision aids and this was broadcast over a C.B.C. network. Dr. W. P. Callahan's talk at the Annual Meeting of the Ontario Medical Association was televised in colour.

Drs. H. M. Macrae and Michael Shea spent some time at Dr. G. Meyer-Schwickerath's Clinic in Essen, Germany, studying the use of light coagulation in retinal detachment surgery. Dr. J. S. Speakman spent four weeks in Professor Norman Ashton's laboratory in London, England, to further his researches into glaucoma. Dr. D'Arcy Macdonald worked a month at the Contact Lens Department at Moorfield's Eye Hospital in London, England.

The department acknowledges, with gratitude, the continued support of the Canadian National Institute for the Blind for the Fellowships for two postgraduate students, for financial assistance towards travelling expenses for personnel going overseas to study, and for help and collaboration in the functioning of the Eye Bank.

Monies from the Selkirk Eye Research Fund and the Alexander E. MacDonald Foundation have also made possible travel for personnel engaged in research and study and exchange of ideas. This assistance is gratefully acknowledged.

The University of Toronto Eye Alumni supported the department in providing a cash prize for the best clinical paper by a senior postgraduate student at the Annual Departmental Research Meeting. This was awarded to Dr. C. B. Mortimer.

Research

Members of the staff have undertaken the following research work:

The National Health Grant for "Prevention of Blindness from Glaucoma" was continued under the direction of Dr. W. R. F. Luke. Drs. R. K. MacDonald and T. M. Sibay, with technical assistance from Mrs. L. Schubert, have investigated methods for demonstrating anastomoses of the aqueous collector channels with the vascular system using congo-red in the anterior chamber and silver and carbon in the arterial system. This technique has been carried out successfully on several eyes, animal and human, so that they are now studying certain surgical procedures affecting the outflow of aqueous and resultant changes with vascular aqueous connections. Dr. J. S. Speakman has been studying normal anatomy of the drainage channels in the trabecular meshwork in the eye in order to evaluate pathological changes which may be responsible for the increased resistance to aqueous outflow in chronic glaucoma. Miss S. Hennighausen is continuing electronic tonography in the glaucoma laboratory and also operating the tonometer testing station. There has been a considerable increase in the number of patients referred for electronic tonography indicating its usefulness in the diagnosis of glaucoma.

The National Health Grant for "Studies on the Prevention and Treatment of the Ocular Complications of Diabetes" was continued under the direction of Dr. H. R. Hausler in a research unit set up jointly by the Departments of Ophthalmology and Physiology. Drs. Hausler, Sibay, and H. P. Brent have continued the study on the ocular complications of diabetes. Present efforts are aimed towards production of a standard diabetic retinopathy in rats and are intended to provide experimental basis for a more effective therapeutic approach to this important ocular complication of diabetes.

Under a National Health Grant for "Eye Bank and Corneal Transplantation," Dr. P. K. Basu continued his studies on problems of corneal grafting and vitreous implantation with the assistance of Dr. R. R. Toews, Miss I. Miller and Mrs. I. Fielding. A comprehensive study on the cytology of corneal and vitreous tissues has been undertaken. Investigation regarding the use of donor vitreous from patients who have died of cancer is being made to determine whether this material is free from cancer cells. The study on the sex characteristic of corneal tissue has been continued. An investigation is being made on donor eyes which have been stained with bile pigment. Experimentation on the corneal heterograft has been continued. A new project has been undertaken to study the electrophoretic patterns of fresh and stored vitreous. Drs. G. A. Thompson and R. R. Toews are studying the effects of beta radiation on corneal blood-vessels induced by chemical injuries in rabbits' eyes. Mrs. A. Wolf, in conjunction with the Canadian National Institute for the Blind, has been energetically obtaining eyes for the Eye Bank. At the Eye Bank laboratory in the Banting Institute the donor materials are examined and processed before they are distributed to the surgeons for corneal grafting and vitreous implantation.

The National Health Grant for "Biochemical Studies of the Cornea" has continued. Dr. Nina Morley, with the assistance of Mrs. A. Lee and Miss I. Miller, has pursued the study of carbohydrate metabolism in the cornea of normal rabbits. Sensitive methods for the measurement of protein and pyridine nucleotides, oxidized and reduced, have been adopted and levels determined in the corneal epithelium and stromal tissues. The pattern of glucose utilization and lactic acid production by these cells has been followed through several series.

Dr. M. Shea, with the assistance of Dr. W. D. Samis, completed investigations into the "Pathogenesis of the Detachment of the Retina" under a National Health Grant. Drs. Shea and D. L. Anderson have also completed a study on the response to polyvinyl alcohol implants in rabbits. Dr. Shea has commenced a new project on the "Clinical Investigation of Idiopathic Retinal Detachment" and is now organizing a clinic at St. Michael's Hospital for the special study of retinal and vitreous disease with particular reference to idiopathic retinal detachment. In his surgical work he has had the benefit of a light coagulator, an apparatus which has been used with remarkable success elsewhere.

Under a Defence Research Board Grant, Dr. J. C. McCulloch has directed the work of Dr. G. S. Harris and has completed a study of various oximes and their effects on powerful miotic agents such as disopropryl fluoro-phosphate. Dr. McCulloch is also concluding a study of various oximes on anticholinesterases with Dr. W. S. Hunter.

At the Hospital for Sick Children, Dr. A. L. Morgan and staff are carrying on their research programme on the cause and treatment of strabismus. Dr. Morgan has made movies on this subject for teaching purposes. Dr. W. P. Callahan is carrying on a research programme on the etiology of amblyopia ex anopsia. Dr. J. S. Crawford has developed a modification of the surgical technique for ptosis operations.

At the Toronto Western Hospital, Dr. Bernard Teichman has begun an orthoptic clinic with the plan that this will be both a therapeutic and research tool. He also continued during the past year to investigate problems of lachrymal drainage and has extended his series of dacryocystorhinostomy operations. Dr. D'Arcy Macdonald continued to direct the Low Vision Clinic with the collaboration of the Canadian National Institute for the Blind.

At Sunnybrook Hospital several clinical research projects were continued or started. Dr. Bernard Teichman has been studying cases presenting problems in lachrymal drainage and has been directing a study on gonioscopy of pre- and post-operative intraocular surgical cases with Dr. Alain Rousseau. Dr. J. C. Hill, in conjunction with Mr. R. Wainman, Prosthetic Services, made considerable progress in the field of prosthetic orbital appliances which have resulted in improvement in the cosmetic appearance for orbital artificial eyes and eyelids. Dr. G. A. Thompson, in conjunction with Dr. D. E. MacLeod, made a clinical study of the transplanation of the inferior oblique muscle in the eye in patients with macular degeneration, and also treated a similar group of patients with heparin injections.

At the Toronto General Hospital, Dr. G. A. Thompson pursued his clinical investigation on the use of radio-active phosphorus as a diagnostic agent in suspected ocular malignancies. He also developed further the use of frozen, stored cornea in a large number of transplant operations with remarkable success. Dr. H. M. Macrae, in conjunction with Dr. C. B. Mortimer, made a clinical survey of the retinal detachment surgical results in 250 consecutive cases during the past four-year period.

PUBLICATIONS

Basu, P. K., Miller, I. and Ormsby, H. L. "Sex Chromatin as a Biologic Cell Marker in the Study of the Fate of Corneal Transplants" (*American Journal of Ophthalmology*, vol. 49, no. 3, March, 1960, pp. 513–5).

——— "Studies on the Antigenicity of Corneal Heterografts" (*ibid.*, pp. 511–3).

Basu, P. K. and Ormsby, H. L. "Hand Rest for Tudor-Thomas Stand" (*American Journal of Ophthalmology*, vol. 48, no. 1, pt. I, July, 1959, p. 106).

——— "Identification of Sex Chromatin in Corneal Stroma Cells for Determination of Fate of Corneal Transplants" (*Transplantation Bulletin*, vol. 6, no. 2, April, 1959, pp. 435–6).

——— "Tudor-Thomas Metal Stand" (*American Journal of Ophthalmology*, vol. 47, no. 6, June, 1959, pp. 870–1).

Beswick, J. A. "The Diagnosis and Treatment of Pupillary Block Glaucoma" (*Bulletin of the Academy of Medicine, Toronto*, vol. 32, no. 12, Sept., 1959, pp. 187–91).

Crawford, John S. *et al.* "Symposium: Ptosis Complications" (*Transactions of the American Academy of Ophthalmology and Otolaryngology*, vol. 63, no. 5, Oct., 1959, pp. 663–82).

Elliot, A. J. "A Cataract Operation in a Centenarian" (*Canadian Medical Association Journal*, vol. 81, no. 4, Aug., 1959, pp. 247–8).

——— "Lesions of the Macula and Perimacular Region of Involutional and Senile Origin" (*Journal of the Michigan State Medical Society*, vol. 58, Dec., 1959, pp. 2002–6).

——— "Management of Dryness of the Eye" (*Modern Medicine of Canada*, vol. 14, no. 7, July, 1959, pp. 94–5).

Fielding, I. L., Basu, P. K. and Ormsby, H. L. "Antigenic Properties of Fresh and Stored Corneal Proteins" (*American Journal of Ophthalmology*, vol. 49, no. 3, March, 1960, pp. 504–11).

——— "Corneal Proteins" (*ibid.*, vol. 48, no. 1, pt. I, July, 1959, pp. 77–8).

Hausler, H. R. and **Sibay, T. M.** "A Contribution to the Injection Technique for Studying Retinal Blood Vessels" (*American Journal of Ophthalmology*, vol. 48, no. 1, pt. II, July, 1959, pp. 138–40).

——— "Injection Technique for Studying Retinal Blood Vessels" (*British Journal of Ophthalmology*, vol. 44, no. 1, Jan., 1960, pp. 46–9).

Kelly, R. G. C. "Acute Dacryocystitis in a Two-Month Old Baby" (*Transactions of the Canadian Ophthalmological Society*, vols. 20 and 21, 1959, pp. 216–8).

Langley, R. K., **Mortimer, C. B.** and **McCulloch, C.** "The Experimental Production of Cataracts by Exposure to Heat and Light" (*American Medical Association Archives of Ophthalmology*, vol. 63, no. 3, March, 1960, pp. 473–88).

Lloyd, Lois A. "Protect their Eyes" (*Health for You and Your Family*, vol. 27, Sept.-Oct., 1959, pp. 6–7, 22).

McCulloch, C. "A Case of Amaurosis Following Occlusion of the Internal Carotid Artery Treated by Cyclodiathermy" (*British Journal of Ophthalmology*, vol. 44, no. 5, May, 1960, pp. 306–8).

McCulloch, C., **Turnour, N. C.** and **Smiley, J. R.** "A Field Study of Hardy-Rand-Rittler Color Vision Plate Test" (*American Journal of Ophthalmology*, vol. 48, no. 1, pt. II, July, 1959, pp. 124–9).

Macdonald, D. "Low Vision Aids" (*Modern Medicine of Canada*, vol. 14, no. 6, June, 1959, pp. 79–83).

——— "Newer Aids for Vision" (*Applied Therapeutics*, vol. 2, no. 4, April, 1960, pp. 289–93).

Neveu, M. and **Elliot, A. J.** "Prophylaxis and Treatment of Endophthalmitis" (*American Journal of Ophthalmology*, vol. 48, no. 3, pt. I, Sept., 1959, pp. 368–73).

Shea, M. "Retinoschisis" (*American Medical Association Archives of Ophthalmology*, vol. 63, no. 1, Jan., 1960, pp. 1–9).

Speakman, J. S. "Stain Permeability and Ultrastructure of the Corneal Endothelium" (*American Medical Association Archives of Ophthalmology*, vol. 62, no. 5, Nov., 1959, pp. 882–8).

Wolf, A. "The Eye Bank of Canada" (*Ontario Medical Review*, vol. 26, no. 9, Sept., 1959, pp. 812–4).

OTO-LARYNGOLOGY

Under the direction of Professor P. E. Ireland

The postgraduate programme in oto-laryngology has continued in 1959 and 1960 with a three-year residency in this specialty being inaugurated. There is still some confusion with regard to the Royal College of Surgeons' requirements for training, but an effort is being made to correlate the complete schedule and to obtain suitable posts that fulfil the programme, in addition to the three years spent in the specialty. All of our trainees are now given an additional year of general surgery or the alternate of six months general surgery, and six months internal medicine. Aside from some difficulty in obtaining suitable intern appointments outside our own department, this seemed to be an improvement. We now have Senior Residents, who by their training can accept an increasing amount of responsibility in the care of clinical cases. This has not only improved the status of the men we graduate, but also has helped supply the various hospitals with adequate men trained at a resident level. As in the previous year, we have found no difficulty in obtaining suitable graduates to fill these positions. This is in marked contrast to the situation some ten or twelve years ago. The fact that physicians of much better academic standing and calibre are entering this specialty is encouraging.

The undergraduate teaching programme has continued very much as before, except for the replacement of many of the didactic lectures by outpatient or bedside teaching. One would hope that this method would be explored still further by the committee on curriculum.

The final year of the two-year course in Speech Pathology and Audiology has been completed under the Division of Rehabilitation Medicine. An increased number of our staff acted as lecturers in this final year, and have taken the work in audiology completely under their direction. This has included practical work at the Hospital for Sick Children's audiology laboratory, as well as at St. Michael's Hospital and Sunnybrook. We are pleased to report that all those reaching the final year of this course have been assured of positions in the field. There is still a great shortage of trained audiologists throughout Canada.

The Audiology Centre of the Toronto General Hospital is almost completed. This is located in the new Out-Patients' Department on the second floor of the old emergency building. Funds for the equipment were supplied by the André Dorfman bequest, a gift of ten years ago. When finally completed the centre will be capable of doing any test at present known to Audiology. The area itself has been rehabilitated through the Toronto General Hospital Building Fund, and will be completely air-conditioned and sound-proofed to the best of the ability of the consulting engineers who were interested in this project. There will also be special equipment attached to this area to enable us to do all the latest vestibular tests.

The Out-Patients' Department for oto-laryngology in the Toronto General Hospital has also been completed and includes a separate student teaching area. This has new furnishings and equipment and will be a very useful addition to the teaching in this field.

An attempt has been made to correlate the various research projects related to the special sense of hearing and of balance which are in progress in all parts of the University. This includes collaboration with the Defence Research Laboratories, the Sullivan Research Unit in Vestibular Diseases at St. Michael's Hospital, the research in the Department of Physiology as well as that in our department. We are fortunate in having the National Research Council Assistantship for Dr. Farkashidy, as well as the McLaughlin Fellowship for Dr. Elizabeth McKee. Dr. W. Johnson continues to work as a consulting physiologist on an O'Keefe Fellowship.

The Head of the Department has been re-elected to the Council of the Royal College of Physicians and Surgeons of Canada and this year completes his term on the council of the Canadian Otolaryngological Society and the American Triological Society. He was chairman of the section of Otology and Laryngology at the combined meetings of the British and Canadian Medical Associations in Edinburgh, in July, 1959, and also had the opportunity of attending and speaking at clinics in Paris and Zurich. He continues as a member of the Board of Directors of the American Board of Otolaryngology.

Dr. G. Arnold Henry was President of the Canadian Otolaryngological Society at its annual meeting in Niagara Falls in September, and chairman of the programme committee of the combined Edinburgh meeting. He also was chairman of a round-table discussion on "Vertigo" at the Edinburgh meeting. Dr. Sullivan, formerly of this Department, Dr. Henry, Professor Ireland, and Dr. T. J. Molony attended the meeting of the section of otology of the Royal Society of Medicine at Derby, England, in July, 1959. At this meeting Dr. Sullivan gave a paper on "Facial Nerve Paralysis." Dr. Brydon Smith and Dr. W. Johnson presented a paper at the meeting of the Otological Society in Miami in January, 1960. Dr. Brydon Smith and Dr. J. Sullivan presented a course of instruction at the American Academy of Ophthalmology and Otolaryngology, held in Chicago in October, 1959. Dr. Page Statten has given six talks to various organizations on the work of the Hearing Clinic of the Hospital for Sick Children. Dr. Ireland was chairman and Dr. Hugh Barber took part in a round-table discussion on "Dyspnoea" at the Canadian Otolaryngological Society Meeting in Niagara Falls, in September, 1959. Dr. Douglas Bryce and Dr. Morgan Brosnan presented a review of the "Radiological and Surgical Treatment of Carcinoma of the Larynx" at the meeting of the Canadian Otolaryngological Society at Jasper in June, 1960. Dr. Blair Fearon presented a paper on "Endoscopic Diagnosis and Management of Hiatal Hernia in Children" at the Pan-American Congress of Otolaryngology, Miami Beach, in March, 1960.

Research

One of the main research projects is being directed by Dr. Joseph Farkashidy under a National Research Council Grant. This consists of two parts. The first of these is "Electron Microscopic Studies of the Organ of Corti and the Peripheral Vestibular Receptors of Healthy Guinea-Pigs." Laboratory and dark-room facilities have been set up for this purpose in the department with the necessary technical equipment. This procedure serves as a preliminary for further electron microscopic studies on experimentally induced hair-cell lesions of the cochlear and vestibular end-organs. The second part of this investigation has been the introduction of intravital perfusion in animals to show enzyme activity on the sites of efferent nerve-endings in the labyrinth. The electrophysiologic studies consist of recording impulses from the eighth nerve and eliciting rebound phenomena after peripheral stimulation. This work has also been aided by the assistance of Dr. Elizabeth McKee, who is working at St. Michael's Hospital in the clinical aspect of vestibular disease.

Dr. Walter Johnson and Dr. Brydon Smith have continued the research programme at St. Michael's Hospital under the Sullivan Research Grant. This has largely been in the completion of suitable clinical tests necessary in the assessment of the symptom of vertigo. They have also studied selective stimulation of the semicircular canals using rotation in the tests and have presented a paper on this subject before the American Otological Society in January, 1960.

At the Hospital for Sick Children, Dr. Page Statten has continued his research in the Children's Hearing Clinic. In the past year, two problems have taken special interest in this clinic: first, "Maternal Rubella and Deafness in the Infant" and secondly, "The Problem of Hearing Defects in the Cleft-Palate child."

At the Toronto General Hospital, Dr. Barber has continued his investigation of vestibular problems as related to special diagnosis in head injuries and neuro-surgical cases. He has also joined in the investigation team working in the acute respiratory paralysis unit.

Dr. Bell of the Toronto Western Hospital has worked along with the Division of Allergy in the investigation of "Vasomotor Rhinitis and Allergic Problems of Particular Interest to the Otolaryngologist."

A grant for the establishment of a laboratory for the pathological preparation and section of temporal bones has been awarded by the Defence Research Board. This was under Professor Hamilton but has now been transferred to the Department of Oto-laryngology. It will aid greatly in the study of research material.

PUBLICATIONS

Barber, H. O., Chambers, R. A., Fairley, H. B. and Woolfe, C. R. "A Respiratory Unit; The Toronto General Hospital Unit for the Treatment of Severe Respiratory Insufficiency" (*Canadian Medical Association Journal*, vol. 81, no. 2, 1959, pp. 97–101).

Brosnan, M. L. "Report of a Case of Double Trachea" (*Journal of Laryngology and Otology*, vol. 73, no. 12, Dec., 1959, pp. 853–5).

Fearon, B. "The Endoscopic Management of Congenital Atresia of the Esophagus with or without Tracheo-Esophageal Fistula and of Congenital Tracheo-Esophageal Fistula without Atresia of the Esophagus" (*Annals of Otology, Rhinology and Laryngology*, vol. 68, no. 4, Dec., 1959, pp. 1047–68).

Fearon, B. and Sass-Kortsak, A. "The Management of Esophageal Varicies in Children by Injection of Sclerosing Agents" (*Annals of Otology, Rhinology and Laryngology*, vol. 68, no. 3, Sept., 1959, pp. 906–15).

PAEDIATRICS

Under the direction of Professor A. L. Chute

July, 1959, was marked by the Ninth International Meeting of Paediatrics. This was held in Montreal, but there were large numbers of visitors to our hospital both before and after the meeting. Six Polish physicians studied in our clinics for six weeks before the congress and four Indonesians remained after the congress for a month of observation and instruction. In all, over three hundred visitors from many countries, from the East and the West and from both sides of the Iron Curtain, spent some time in our clinics. Many expressed the hope that physicians from their own countries might look forward to obtaining a period of training in paediatrics here in the future.

A revision of the fourth-year teaching has been undertaken for the coming year. Students will assume the duties of clinical clerks with more emphasis on student participation and less didactic teaching. A daily seminar for the presentation of cases which they have been following has been arranged. Third-year teaching has remained unchanged for the past two or three years except for the introduction this year of an oral examination at the end of each eight-week period. This has helped both the students and the staff to appreciate certain deficiencies in their learning or in their teaching, as the case may be.

Research

All research in the Hospital for Sick Children is conducted under the auspices of the Research Institute.

Dr. John Bailey has been furthering his study of growth hormone in pituitary dwarfs and has had some success with the exhibition of human growth hormone. In conjunction with Dr. Slater efforts have been made to measure levels of growth hormone in serum by the haemagglutination technique. He has also studied the effect of androgenic metabolic hormones in the treatment of dystrophic children. Dr. Crozier has also been interested in this problem from the standpoint of treating children with fibrocystic disease.

Dr. Slater has continued his investigations into the mechanisms of immunological disease and also studies on the electrolyte metabolism in infants and children.

Dr. J. D. Keith and Dr. R. D. Rowe have continued their studies in congenital heart disease and have furthered their studies on the use and combination of salicylate and steroid therapy in the management of rheumatic fever.

Dr. Prichard's study of brain damaged children continues. He also is following a group of children with phenylketonuria who have been placed on low phenylalanine diets to observe the effects of this treatment.

Dr. Fraser has continued his studies on the homeostasis of calcium and phosphorus metabolism.

Dr. Swyer has contributed considerably to the knowledge of normal respiratory function in the newborn period.

Dr. Rance and Dr. Slater have brought to light an interesting family suffering from congenital nephrosis which is unresponsive to steroid therapy.

Dr. A. Sass-Kortsak has been granted leave of absence and has been studying, in Stockholm, some of the problems of enzyme kenetics in liver disease.

Publications

Bain, H. W. "Coxsackie Virus Infections" (*Modern Medicine of Canada*, vol. 14, no. 10, Oct., 1959, pp. 113–20).

Chute, A. L. "Canadian Paediatric Contributions to Medical Progress" (*Bulletin of the Medical Library Association*, vol. 48, no. 1, Jan., 1960, pp. 37–43).

Collins-Williams, C. "Eczema in Children" (*Health*, vol. 28, no. 2, April, 1960, pp. 8–9, 36).

——— "Prognosis of Asthma in Children" (*Canadian Medical Association Journal*, vol. 82, Jan. 2, 1960, pp. 33–7).

——— "The Recognition and Treatment of the Allergic Child" (*Medical Graduate*, vol. 6, no. 2, 1959–1960, pp. 9–13).

Collins-Williams, C., Edwards, H., Savage, H., Fremes, A., Cole, A. and Imrie, R. "An Analysis of the Effect of Various Dosage Schedules in Hyposensitizing Programmes for Allergic Children" (*Annals of Allergy*, vol. 18, Jan., 1960, pp. 92–7).

Darte, J. M. M. "Ovarian Tumours in the Pre-Menarchial Child" (*Clinical Obstetrics and Gynecology*, vol. 3, 1960, p. 187).

——— "Radiotherapy in Children" (*Modern Medicine of Canada*, vol. 14, 1959, p. 87).

Ehrlich, R. M. "A Neurological Complication in Children on Phenothiazine Tranquillizers" (*Canadian Medical Association Journal*, vol. 81, Aug. 15, 1959, pp. 241–3).

Fraser, D., Leeming, J. M. and Cerwenka, E. A. "Ueber die Handhabung von Phosphat durch die Nieren bei hypophosphatamischer vitamin-D-resistenter Rachitis der einfachen Art und bei Cystinspeicherkrankheit-Reaktion auf verlangerte Calciuminfusion" (*Sonderabdruck aus Helvetica Paediatrica Acta*, vol. 14, fasc. 5/6, 1959, pp. 497–505).

Laski, B. and MacMillan, A. "Incidence of Infection in Children after Splenectomy" (*Pediatrics,* vol. 24, no. 4, Oct., 1959, pp. 523–7).

McKendry, J. B. "Anomalies of the Diaphragm" (*Bulletin of the Hospital for Sick Children,* Sept., 1959, pp. 68–71)

——— "Management of Enuresis" (*ibid.,* July, 1959, pp. 58–9).

——— "New Treatment for Bilateral Legg-Calve-Perthes Disease" (*Canadian Medical Association Journal,* vol. 82, March 5, 1960, pp. 550–1).

——— "Urolithiasis in Children" (*ibid.,* Feb. 13, 1960, pp. 352–5).

——— "What to do in an Emergency" (*Health,* vol. 27, July-Aug., 1959, pp. 6–7).

McLean, D. M., Krause, V. W., Wilson, W. M. and Hawke, W. A. "Rabies Following Skunk Bite" (*Canadian Medical Association Journal,* vol. 82, Feb. 6, 1960, pp. 315–7).

Murphy, E. G. "The Child with Progressive Muscular Dystrophy"; in *The Child with a Handicap,* by Edgar A. E. Martmer, pp. 221–32. Chicago: Charles C. Thomas. 1959.

——— "Primary Muscle Disorders"; in *A Manual of Paediatrics for South East Asia,* ed. P. Robinson and A. Wallgren, pp. 240–4. Bombay: Orient Longmans. 1959.

Prichard, J. S. (with Dr. D. A. McGreal). "Convulsiones Febriles" (*Progresos de Patologia y Clinica,* vol. 6, 1959, p. 219).

——— "Epilepsy in Children" (*Current Therapy,* vol. 12, 1960, pp. 537–41).

Rebhan, A. W. and Edwards, H. E. "Staphylococcal Pneumonia" (*Canadian Medical Association Journal,* vol. 82, March 5, 1960, pp. 513–7).

Rogers, S. "Griseofulvin in the Treatment of Tinea Capitis" (*Bulletin of the Hospital for Sick Children,* Jan., 1960, p. 13).

Rose, Vera. "Infants of Diabetic Mothers: Clinical and Pathological Features in a Series of 25 Cases (*Canadian Medical Association Journal,* vol. 82, Feb. 6, 1960, pp. 306–10).

Rowe, R. D. "Heart Disease in the First Year of Life . . . a Challenge" (*Manitoba Medical Review,* vol. 39, no. 7, Aug.-Sept., 1959, pp. 485–92).

Slater, R. J. "Hypertension in Children" (*Canadian Medical Association Journal,* vol. 81, July 15, 1959, pp. 71–7).

——— "Proteinuria in Health and Disease" (*American Medical Association Journal of Diseases of Children,* vol. 98, Nov., 1959, p. 641).

Snelling, C. E. "Chronic, Recurrent, Abdominal Pain in Children" (*Medical Times,* vol. 87, no. 9, Sept., 1959, p. 1147).

Swyer, P. "Problem of Prematurity: Paediatric Aspects" (*Canadian Medical Association Journal,* vol. 82, Feb. 13, 1960, pp. 347–51).

——— "Ventilation and Ventilatory Mechanisms in the Newborn" (*Journal of Pediatrics,* vol. 56, no. 5, May, 1960, pp. 612–22).

Watson, D. G., Rowe, R. D., Conen, P. E. and Duckworth, J. W. "Mitral Atresia with Normal Aortic Valves" (*Pediatrics,* vol. 25, no. 3, part I, March, 1960, pp. 450–67).

PATHOLOGICAL CHEMISTRY

Under the direction of Professor James A. Dauphinee

During the session 1959–60, 146 undergraduate students in the third year of their medical course have attended the lectures and laboratory classes in Pathological Chemistry. Eight graduate students, including four Ph.D. candidates and four others who are either taking a Ph.D. minor in Pathological Chemistry or are not proceeding to a degree, have been carrying out research programmes or taking courses in the department.

No serious changes have been made in the nature of the undergraduate course but increasing emphasis is being placed on seminar discussions in which, in an informal way, clinical and laboratory manifestations of a specific illness are discussed and correlated by one of the Demonstrators with small groups of students. The advanced course in Pathological Chemistry, which aims at a critical examination of recent methods, findings and theories concerning the biochemical disturbances in disease and which is intended either for students in the School of Graduate Studies who wish to take a minor in this subject or for medical and other graduates training in the specialty of Clinical Pathology or Clinical Chemistry, has been considerably reorganized with the object of improving its scope and usefulness.

We are pleased to report the appointment of Dr. Cinader as Associate in Pathological Chemistry. Dr. Cinader is the Associate Professor of Medical Biophysics in charge of Immunochemistry and he brings to the department expert knowledge of an aspect of our subject which is becoming of increasing importance. No other changes have occurred in our senior staff.

Research

Drs. Dauphinee and Gornall with Dr. Walfish of the Department of Medicine and Dr. Halmos of Sunnybrook Hospital have studied the response of patients with cirrhotic ascites to treatment with various forms of diuretics, including the newly developed aldosterone antagonists. In the case of the latter group it would appear that although some patients respond rapidly and well to these substances, others are highly resistant to their effect and for this reason other diuretics such as chlorothiazide have to be added to the medication if a good response is to be achieved. Still others require the further addition of prednisone or one of the other similar steroids to obtain a satisfactory result. The evidence suggests that there is a correlation between amount of aldosterone antagonist necessary and the secretion rate of aldosterone by the patient's own adrenals. This aspect is being investigated further.

Mr. C. E. Downs has continued to study the effect of penicillamine on the excretion of urinary copper in normal people and in patients with hepatic cirrhosis and other diseases.

Dr. Barry Tobe has expanded his investigations of blood ammonia and its relation to the occurrence of hepatic coma in patients with cirrhosis and necrosis of the liver and he is also investigating the possibility that other volatile bases may be present and be of importance in the blood of these patients.

Reported by Professor T. F. Nicholson

Dr. Abraham Rapoport has been studying the mechanisms of the transfer of electrolytes across the wall of the urinary bladder and has shown that they move passively in the direction of the concentration gradient.

Mr. L. A. Wright has been modifying the Hanes method of determining of amino acids for use on urine as a preliminary to studying the handling of amino by the kidney.

Dr. Nicholson has continued to investigate the localization of the functions of the renal tubules. He has shown that hydrogen ions are secreted in all parts of the tubule and that damage to any part of the nephron will interfere with the regulation of acid-base balance. He has also shown that very slight damage to the lower end of the proximal tubule causes a decreased excretion of chloride and hydrogen ions and an increased excretion of sodium, potassium and bicarbonate. In addition he has found that citrate is reabsorbed in the first third of the proximal tubule.

Reported by Professor A. G. Gornall

Research projects in this section have been concerned mainly with aldosterone and the possible role of this hormone in the pathogenesis of hypertension and other derangements of electrolyte metabolism.

Dr. Velta Cernavskis has continued her study of the protein binding of steroids.

Dr. S. L. Cohen has resumed his investigations of optimal conditions for the hydrolysis of pregnanediol glucuronide.

Dr. F. R. Papsin has developed an improved method of measuring systolic blood-pressure in the conscious rat. He has used the method in a study of the relative importance of renal and adrenal factors in the etiology of hypertension.

Mrs. B. Grajman and Mrs. H. Pavuls have carried out tissue electrolyte analyses and studied various factors that may cause alterations in intracellular sodium and potassium.

Miss D. Mueller has assisted with the experimental hypertension projects, in particular the effect of stress on blood-pressure.

In the Steroid Hormone Laboratory the microchemical estimation of aldosterone in urine has been carried out by Mrs. C. Gwilliam, Mrs. M. L. Schönbaum, and Mrs. V. Barcza. Mrs. M. Kandel has had charge of isotope measurements using a liquid scintillation spectrometer under the supervision of Dr. W. Paul. By means of tritium-labelled aldosterone it has been possible not only to improve the accuracy of urine assays, but from isotope dilution measurements to obtain secretion data as well.

In the Clinical Investigation Laboratories Mrs. V. Reinholds has been responsible for all analyses of nitrogenous and ketone substances, Mrs. Pavuls for seventeen ketosteroid and ketogenic corticoid estimations.

The following problems have been under study during the year by Dr. J. A. Dauphinee and Dr. A. G. Gornall in collaboration with the clinical departments: the use of aldosterone antagonists and other drugs in the treatment of cirrhosis with ascites and edema, with Drs. P. G. Walfish and V. Halmos, Department of Medicine; factors affecting the secretion, biological action, metabolism and excretion of aldosterone, with Drs. J. C. Laidlaw, M. E. Robertson and J. L. Ruse; aldosterone excretion in patients suffering from hypertension, edema, and other related disorders, with clinicians in several departments; hormonal and metabolic studies in recurrent psychic disorders, carried out with the help of Miss Amy Britton, with Dr. J. Lovett Doust and associates, Department of Psychiatry.

The generous support obtained from the Medical Division of the National Research Council and from the J. P. Bickell Foundation is gratefully acknowledged.

Reported by Professor Wm. Paul

The facilities of the biophysics laboratory were fully utilized for the past year in collaboration with the clinical departments of the Faculty of Medicine.

Miss A. Britton, with the co-operation of Dr. P. G. Walfish, Dr. C. Ezrin, and others in the Department of Medicine, is engaged in the study of distribution of the uptake of radioactive thyroid hormones between the plasma and red blood cells of patients undergoing endocrine investigation. This work is being expanded into the clinical and basic science aspects of endocrinology.

Radioactive isotopes as indicating agents were added to the well advanced work with dyes for the study of cardiac disease. Dr. R. W. Gunton with the aid of Dr. M. M. Gorelick (Department of Medicine) initiated an attempt to measure coronary flow in animals and man by a technique involving both dye and radioactive labelling of a tracer substance injected near the aortic valve.

With the aid of the neurosurgeons in the Department of Surgery, Drs. E. H. Botterell, T. P. Morley, and W. M. Lougheed, well over one hundred patients were scanned with a view to localizing cerebral neoplasms. This investigation has fulfilled the original aim by providing a clear evaluation of the use of positron emitting arsenic in the external localization of brain tumours.

Other studies using P-32 with beta-ray detectors placed close to the suspected site by surgical intervention are also continuing.

Assistance provided by a grant from the Ontario Cancer Treatment and Research Foundation for the research cited related directly to cancer is gratefully acknowledged.

Studies on the degradation rate of radioactive thyroxine in schizophrenic patients have continued with the co-operation of Dr. Philip Melville and the Metabolic Unit of the Toronto Psychiatric Hospital.

Publications

Gornall, A. G., Grundy, H. M. and Koladich, C. J. "Studies on Aldosterone. III. Chronic Effect on the Blood Pressure of Rats" (*Canadian Journal of Biochemistry and Physiology*, vol. 38, no. 1, Jan., 1960, pp. 43–50).

Nicholson, T. F. "The Effect of Damage to the First Part of the Proximal Tubule on Electrolyte Excretion" (*Federation Proceedings*, vol. 19, no. 1, March, 1960, p. 368).

——— "Some Effects of Minimal Damage to the Lower Portion of the Proximal Tubules of the Dog's Kidney" (*Physiologist*, vol. 2, no. 3, Aug., 1959, p. 90).

Rapoport, A., Nicholson, T. F. and Yendt, E. R. "The Movement of Electrolytes across the Wall of the Urinary Bladder in Dogs" (*American Journal of Physiology*, vol. 198, no. 1, Jan., 1960, pp. 191–4).

PATHOLOGY

Under the direction of Professor J. D. Hamilton

The only change in the teaching programme occurred in the third medical year, during the second term, when the five groups meeting in the Banting Institute were consolidated into one, with case conferences presented by two members of the staff at each session. This change was necessitated by a shortage of teaching staff, and turned out to be in general less satisfactory than group teaching.

Dr. J. Olszewski took up his duties as Head of the Division of Neuropathology in October and quickly instituted a broad teaching and research programme. Dr. Stephen M. Shea joined the staff in General Pathology and added notably to the various activities of the department.

Professor Hamilton addressed the Hamilton Academy of Medicine, the Eastern Regional meeting of the Royal College of Physicians and Surgeons of Canada in Halifax, the Fourth Scientific Assembly of the College of General Practice in Montreal, and the Refresher Course at Dalhousie University. He also gave the first CAMSI lecture on Medical Education in Toronto and was Visiting Professor to Laval University.

The department was greatly aided in having the assistance of Dr. Suk Chul Chang in the teaching programme of the second and third medical years.

Division of Neuropathology

Reported by Professor J. Olszewski

The teaching of Neuropathology for the second-year medical students was continued under the same schedule as in previous years. The collection of neuropathological slides must be revised and new slides added. This work cannot be undertaken until the present technical and secretarial staff is enlarged. The results of this year's examination in Neuropathology in second-year medicine were very discouraging. To judge by the answers given, a large proportion of this year's class is not sufficiently prepared to obtain the full benefit of bedside teaching in Neurology and Neurosurgery. It is hoped that steps will be taken to improve this situation in the future.

The main activity of the division continued to be routine service to the Toronto General Hospital on autopsy and surgical material. It is expected that this situation will be radically changed when an active research programme is started during the next year. The rooms occupied by the division are in urgent need of thorough renovation. There is also an immediate need to purchase basic permanent equipment necessary for experimental research.

Members of the division took part in scientific meetings and presented papers. Professor Olszewski and Dr. Rewcastle participated in the meeting of the Association for Research in Nervous and Mental Diseases in New York City. Professor Olszewski presented results of his study on "Pathological Changes in the Brain-Stems of Cats after Transection of the Cochlear Nerve" at the meeting of Cajal Club in New York City, and took part in the International Anatomical Congress. Professors Tom and Olszewski, and Dr. Lampert took part in the meeting of the American Association of Neuropathologists. Professor Olszewski delivered at this meeting a paper entitled "The Myth of Binswanger's Disease." In addition, members of the division presented several papers at the scientific meetings of local groups.

Professor Tom and Dr. Lampert have been elected members of the American Association of Neuropathologists. Professor Olszewski is serving as a member of the panel in Neuroanatomy of the Council for International Organizations of Medical Sciences. He also has been appointed as Consultant in Neuropathology to the Toronto Hospital for Sick Children.

The division was visited by Professor J. Cumings from Queen Square, London, who delivered an informal lecture on "Lipidoses of the Central Nervous System." Professor Mathieson from the Montreal Neurological Institute visited the division twice in connection with his work in collaboration with Professor Olszewski on the "Stereotaxic Atlas of the Cats' Brain-Stems." Drs. Schuknecht and McGee from the Henry Ford Hospital in Detroit visited the division to conclude their work on "Toxicity of Streptomycin" which was conducted jointly with Professor Olszewski.

Dr. R. A. Chambers resigned his post of Research Associate to accept an appointment at Seton Hall Medical School in New Jersey. We regret having lost an able investigator and a congenial companion.

Finally, it is my pleasant duty to acknowledge with thanks a friendly reception given to me by all members of the staff on my joining the division. To be perfectly just, I should mention all members by their names and enumerate their individual gestures of kindness. The limitation of space prevents me from doing so. However, I cannot restrain from expressing my particular gratitude to Professor Mary I. Tom whose profound knowledge of Neuropathology, enthusiasm, devotion, and good humour are hard to emulate but easy to admire.

Research

The most important development of the year was the installation of an electron microscope. This microscope, obtained by a grant from the Department of National Health, Ottawa, is for the use of the Department of Pathology and those other departments housed in the Banting and Best Institutes. It has been most extensively used by Drs. H. J. Movat, J. W. Steiner, and J. Farkashidy, the latter being a member of the Department of Oto-laryngology.

Professor Hamilton and Dr. Steiner have continued their investigation of immunologic tissue injury, principally in the liver. Dr. Steiner, in collaboration with Drs. B. Langer and D. L. Schatz, investigated the effects of Freund's adjuvant in rabbits and, in addition, succeeded in producing iso-immune lesions in rabbit adrenal. Dr. Steiner has collaborated extensively with Drs. Movat and R. J. Slater in their studies of renal disease.

Dr. Movat, in co-operation with Drs. Steiner and Slater, has studied the progression of lipoid nephrosis to chronic glomerulonephritis with the aid of the electron microscope. He has also, with Dr. E. R. Yendt, investigated the fine structure of the glomerulus in chronic glomerulonephritis and nephrotoxic nephritis in dogs. In collaboration with Dr. N. V. P. Fernando, Dr. Movat is studying the fine structure of connective tissue. Experiments dealing with fibrillogenesis in healing wounds and with the formation of ground substance are in progress.

In the Autopsy Service Drs. W. H. McCrae and P. E. Blundell have continued to study the nature of the Ampulla of Vater under the direction of Dr. N. T. McPhedran. Dr. McCrae also reviewed all the cases of carcinoma of the bladder coming to autopsy. Dr. John Lorinc made a study of mesotheliomas. Dr. H. J. Barrie has continued his investigations of renal lesions, and has completed studies on pneumocystis infection and nepheline pneumoconiosis.

In Surgical Pathology Dr. W. Anderson has continued his investigations on bone, principally using the technique of undecalcified sections. This has been applied to the study of metabolic bone disease, radiation changes in bone, and degenerative joint disease. Other investigations undertaken under the direction of Dr. Anderson include the blood-stream dissemination of malignant cells. In collaboration with Dr. Stuart Gordon, studies on experimental tendon repair are progressing.

Dr. D. W. Thompson has continued to work on the preparation of an atlas on Gynaecological and Obstetrical Pathology. He is also correlating atypical cytological changes with biopsy of the same material; reviewing ovarian tumours in correlation with recent advances in histologic and bio-assay techniques; following carcinoma *in situ* of cervix with respect to the comparative merits of conization and hysterectomy therapy; compiling a registry of cases of hydatidiform mole and choriocarcinoma; studying the significance of endometrial hyperplasia; and evaluating the fluorescent technique for screening cytologic material. Drs. G. W. Sutherland and G. Lau have compared staining techniques for improving the demonstration of micro-organisms in granulomatous lesions.

Dr. R. J. MacKay has continued to work with Professor A. M. Fisher in the School of Hygiene on the production of experimental pneumoconiosis and lung tumours.

Dr. Calvin Ezrin has continued his study of the cytologic changes in the pituitary in association with various diseased states.

Division of Neuropathology

Professor M. I. Tom in collaboration with Dr. W. M. Lougheed continued to study the effects of subarachnoid bleeding in dogs.

Dr. P. Lampert studied the tissue reaction in an unusual case of demyelinating disease in man.

Dr. N. B. Rewcastle investigated neuropathological lesions associated with Hodgkin's disease. He also started a study of complications resulting from intracarotid injection of Thorotrast. This latter work is supported by Testagar and Company, Inc., in Detroit.

Professor Olszewski studied neuropathological lesions in streptomycin intoxication in cats and prepared an historical review of Binswanger's disease.

Publications

Birse, S. H. and Tom, M. I. "Incidence of Cerebral Infarction associated with Ruptured Intracranial Aneurysms: A Study of 8 Unoperated Cases of Anterior Cerebral Aneurysms" (*Neurology*, vol. 10, no. 2, Feb., 1960, pp. 101–6).

Donohue, W. L., Laski, B., Uchida, I. and Munn, J. D. "Familial Fibrocystic Pulmonary Dysplasia and its Relation to the Hamman-Rich Syndrome" (*Pediatrics*, vol. 24, no. 5, Nov., 1959, pp. 786–813; abstract, *American Medical Association Journal of Diseases of Children*, vol. 98, no. 4, Oct., 1959, pp. 503–4).

Ezrin, C., Swanson, H. E., Humphrey, J. G., Dawson, J. W. and Hill, F. M. "Beta and Delta Cells of the Human Adenohypophysis: Their Response to Adreno-cortical Disorders" (*Journal of Clinical Endocrinology and Metabolism*, vol. 19, no. 6, June, 1959, pp. 621–31).

——— "The Cells of the Human Adenohypophysis in Thyroid Disorders" (*ibid.*, vol. 19, no. 8, Aug., 1959, pp. 958–66).

Hamilton, J. D. "Current Concepts of Coronary Sclerosis and Thrombosis" (*Nova Scotia Medical Bulletin*, vol. 39, no. 5, May, 1960, pp. 146–51).

———"The Medical School and the University" (*University of Toronto Medical Journal*, vol. 37, no. 4, Feb., 1960, pp. 103–8).

Hamilton, J. D. and Mowbray, J. H. "Intramural Hemorrhages and the Histogenesis of Atherosclerosis"; in *Work and the Heart*, by F. F. Rosenbaum and E. L. Belknap, pp. 233–42. New York: Paul B. Hoeber. 1959.

Lampert, P., Tom, M. I. and Rider, W. D. "Disseminated Demyelination of the Brain Following CO^{60} (Gamma) Radiation" (*American Medical Association Archives of Pathology*, vol. 68, no. 3, Sept., 1959, pp. 322–30).

Linell, E. A. and Tom, M. I. "Traumatic Arterial Lesions and Cerebral Thrombosis" (*Canadian Medical Association Journal*, vol. 81, no. 10, Nov. 15, 1959, pp. 808–13).

Movat, H. Z. "The Fine Structure of the Glomerulus in Amyloidosis" (*American Medical Association Archives of Pathology*, vol. 69, no. 3, March, 1960, pp. 323–32).

Movat, H. Z. and McGregor, D. D. "The Fine Structure of the Glomerulus in Membranous Glomerulonephritis (Lipoid Nephrosis) in Adults" (*American Journal of Clinical Pathology*, vol. 32, no. 2, Aug., 1959, pp. 109–27).

Movat, H. Z. and Wilson, D. R. "The Fine Structure of Plasma Cells in Relation to their Function" (*Canadian Medical Association Journal*, vol. 81, no. 3, Aug. 1, 1959, pp. 154–9).

Steiner, J. W. and Gelbloom, A. J. "Intracranial Manifestations in Two Cases of Systemic Rheumatoid Disease" (*Arthritis and Rheumatism,* vol. 2, no. 6, Dec., 1959, pp. 537–45).

PHARMACOLOGY

Under the direction of Professor E. A. Sellers

Lectures and laboratory classes have been continued with the second medical year, the second dental year and with the fourth year of the Faculty of Pharmacy. Pharmacological-Therapeutics Conferences are also conducted with the fourth medical year, as a joint-department project.

The large number of new drugs which are introduced yearly places an increasing burden on the student and forces the staff to review critically what should be included and what can be eliminated from the work covered. There is no easy solution. However, this type of problem confronts all departments.

The graduate course in Toxicology was conducted once more, with the able assistance of members of the Laboratory of the Attorney-General of the Province, and of the Department of National Health and Welfare.

Graduate work has been assisted by the renovation of three of the smaller research laboratories. These rooms make a striking contrast with the rest of the department, which is still suffering from years of inadequate maintenance during the depression of the thirties. In spite of certain deficiencies in facilities, during the year we have had the good fortune to add three well qualified professional members to the staff. These are Professors H. Kalant, E. Schönbaum, and Dr. A. V. Marton. Professor Kalant was formerly head of the Biochemistry Section of the Defence Medical Research Laboratories, Professor Schönbaum was in the Banting and Best Department of Medical Research, and Dr. Marton (who is a professional engineer) was with the Department of Engineering Chemistry.

Dr. W. Kalow delivered addresses to the Max Planck Institute, Goettingen, Germany and to the Galton Laboratory, University College, London, England, on the invitation by Dr. L. S. Penrose.

Dr. G. H. W. Lucas addressed the Thirty-fourth Congress of the International Anesthesia Research Society in Washington on the "Discovery of Cyclopropane" and the Canadian Forensic Society in Ottawa on "Crystal, Chromatographic, and Colour Tests for Tranquilizers."

Graduate students have completed the following theses:

For the M.A. degree:

Grossman, Murray. The study of possible toxic properties of potatoes.

Murphy, J. P. The toxicity of aerosols of diethylamidoethoxphosphorylcyanamide and dimethylamidoethoxyphosphorylcyanamide (Tabun).

Research

Research under the direction of Professor E. A. Sellers has proceeded satisfactorily. Dr. W. Russell Taylor has continued his study of the physiological changes which occur in patients suffering from respiratory depression. He has compared certain of the effects of nikethamide, caffeine, prethcamide, and certain other drugs as respiratory stimulants in suitable cases. In this work he has utilized the facilities of the Respiratory Unit of the Toronto General Hospital and has collaborated with Dr. Colin Woolf of the Department of Medicine. Such interdepartmental collaboration is regarded as most desirable. This work has been complemented by somewhat similar investigations in the laboratories of the department.

Mr. Gordon Johnson has measured the effects of catecholamines on metabolic rate and has observed the alteration in rate produced by substances causing the release of endogenous catecholamines or which inhibit the breakdown of catecholamines. The metabolism of catecholamines is a subject of great current interest in neuropharmacology and the drugs investigated are receiving wide attention because of their remarkable effects on the central nervous system in affecting mood, especially in anxiety states. The mechanism of action, which is our fundamental interest, remains obscure and requires much further work. Related to this study is the project investigated by Dr. R. O. Davies. This is aimed at finding more about the factors which produce cardiac arrhythmias and fibrillation during hypothermia. An isolated, but intact, heart preparation is cooled under controlled conditions during which the effects of drugs and other agents are studied. Drugs affecting the autonomic nerve-endings in the heart (including catecholamines and inhibitors) are of obvious interest.

Another long-term study designed to determine the effects of drugs in the prevention and treatment of coronary atherosclerosis is being carried out by Professor Sellers. Prolonged exposure of intact rats to cold results in the production of atherosclerosis. This process may be hastened by feeding diets high in cholesterol. A novel hypothesis of the pathogenesis of these lesions has been suggested and it is hoped that in the coming year this will lead to a study of prophylaxis and treatment with drugs.

Mr. Basil Leong has investigated the effects of exposing animals sensitized with histamine or other substances to relatively low concentrations of sulphur dioxide. This gas is one of the common air pollutants and the application is to find whether sensitized individuals react in an abnormal manner to concentrations of SO_2 at or near those actually encountered in polluted air. If successful, it would be intended to test this hypothesis in humans in connection with the work of Dr. Taylor, to which reference has already been made. Professor Sellers has continued a collaborative study with Professor Schönbaum, formerly of the Banting and Best Department of Medical Research, on the development of goitres. Because of the interrelationship of hormones, this investigation has involved such subjects as control of appetite, growth of individual organs in relationship to growth of the whole body, as well as changes in the thyroid and pituitary glands themselves.

Professor G. H. W. Lucas, with Mr. M. Grossman, completed the study on the action of toxic material formed in potatoes during sprouting or greening in sunlight. While many reports in the literature attribute poisonings in humans to solanine following the ingestion of such potatoes, this experimental study does not substantiate such claims.

In collaboration with Dr. C. Korczak much experimental data on crystal, chromatographic, and colour tests for tranquillizers have been accumulated. A report of this work was given at a meeting of the Canadian Forensic Society in November, 1959. A complete paper for publication is being prepared.

In collaboration with Dr. H. Salem and Mr. D. M. Lucas (Department of the Attorney-General) a paper was published describing the research which led to the use of saran plastic bags as suitable containers for breath samples for determining blood alcohol with the Breathalyzer. These bags are now in use in Ontario and in the State of New York for this purpose.

In collaboration with Mr. E. Chow two studies were begun, the first a preliminary study to assist Professor J. M. Ham and co-workers in the Department of Electrical Engineering to ascertain the effect of alcohol on certain types of physical tests and the second to find a suitable antidote for local anaesthetic poisoning.

In collaboration with Dr. Robert J. Imrie of the Hospital for Sick Children, a revision of the article on "Miscellaneous Poisonings" was prepared for the 1960 issue of *Current Therapy.*

Under the direction of Professor W. Kalow, studies were continued on human cholinesterases, with the assistance of Mrs J. Carter and Mrs. W. Wald. It was found that a small alteration of pH may cause some drugs to change from inhibitors to accelerators of cholinesterase activity. Further observations concerned the number of binding sites and the electrophoretic heterogeneity of the enzyme. Dr. H. J. Barrie of the Department of Pathology and Dr. S. Penny of the East General Hospital, very kindly supplied human brain and other tissues in which atypical cholinesterase has been demonstrated. This has extended previous work on the subject.

A study in collaboration with Dr. N. Simpson of the Department of Genetics showed that levels of normal human cholinesterase are controlled, to a large extent, by a familial, environmental factor, and partially by multifactorial inheritance.

Dr. A. Marton investigated inhibitors and cationic activators of aromatic esterase of human serum; levels of aromatic esterase and cholinesterase were unrelated in healthy subjects but correlated in patients with cancer and liver disease.

A study to assess the genetically controlled acetylation of drugs in individual persons was initiated as a co-operative effort of Drs. H. Simpson and A. Marton.

Mr. T. S. Konop made a systematic study of variation in response to morphine among individual mice of several strains. He is presently pursuing a chance observation which suggests that normal human serum contains a polypeptide that inhibits skeletal muscle.

Research under the direction of Professor H. Kalant has been devoted to two main projects:

1. An investigation of the effects of acute alcoholic intoxication upon electrolyte and water metabolism in the mammal. Miss Caroline Czaja has shown that intoxicating but non-lethal doses of ethanol do not cause adrenal cortical activation when given by mouth. The effects reported by others, following intraperitoneal injection of alcohol, appear to be non-specific effects of shock, rather than direct consequences of alcohol.

Mrs. Wilhelmina Mons has begun an examination of the effects of acute ethanolic intoxication upon the distribution of water and electrolytes in the intra- and extracellular fluid compartments.

The above projects are being supported by grants from the Alcoholism Research Foundation of Ontario.

2. A study of the calcium-binding constituents of the cell wall. Perfusion of normal rat liver with calcium-chelating agents was shown previously to impair the ability of the cells to maintain their normal intracellular composition and metabolic activity, while Ehrlich ascites tumour cells were not so affected. In the past year attempts have been made to identify the calcium-binding constituents of the normal cell wall. In collaboration with Dr. R. K. Murray, Department of Biochemistry, electrophoretic studies are in progress of protein constituents removed from liver by decalcifying perfusion. In collaboration with Dr. T. S. Leeson, Department of Anatomy, the effects of this perfusion on the electron microscopic features of tissue are being investigated. This has given rise to a new and excellent method of fixing tissues for electron microscopy.

PUBLICATIONS

CULLUMBINE, H. and KONOP, T. S. "The Relation between Drug-Induced Excitation in the Cat and Addiction Liability" (*Canadian Journal of Biochemistry and Physiology*, vol. 37, no. 9, Sept., 1959, pp. 1075–9).

DANDIYA, P. C., CULLUMBINE, H. and SELLERS, E. A. "Studies on *Acorus calamus* (IV): Investigations on Mechanism of Action in Mice" (*Journal of Pharmacology and Experimental Therapeutics*, vol. 126, no. 4, Aug., 1959, pp. 334–7).

DANDIYA, P. C., JOHNSON, G. and SELLERS, E. A. "Influence of Variation in Environmental Temperature on the Acute Toxicity of Reserpine and Chlorpromazine in Mice" (*Canadian Journal of Biochemistry and Physiology*, vol. 38, no. 6, June, 1960, pp. 591–6).

DAVIES, R. O., MARTON, A. V. and KALOW, W. "The Action of Normal and Atypical Cholinesterase of Human Serum upon a Series of Esters of Choline" (*Canadian Journal of Biochemistry and Physiology*, vol. 38, no. 6, June, 1960, pp. 545–51).

KALOW, W. "Cholinesterase Types" (*Ciba Foundation Symposium on Biochemistry of Human Genetics*, 1959, pp. 39–56).

——— "The Distribution, Destruction and Elimination of Muscle Relaxants" (*Anesthesiology*, vol. 20, no. 4, July-Aug., 1959, pp. 505–18).

KALOW, W. and GUNN, D. R. "Some Statistical Data on Atypical Cholinesterase of Human Serum" (*Annals of Human Genetics*, vol. 23, pt. 3, 1959, pp. 239–50).

Kalow, W., Lucas, G. H. W. and McColl, J. D. "Containers for Breath Samples for Alcohol Analysis" (*Proceedings of the 2nd International Conference on Alcohol and Road Traffic*, 1955, p. 137).

Marton, A. and Kalow, W. "Studies on Aromatic Esterase and Cholinesterase of Human Serum" (*Canadian Journal of Biochemistry and Physiology*, vol. 37, no. 11, Nov., 1959, pp. 1367–73).

Salem, H. and Cullumbine, H. "Inhalation Toxicities of Some Aldehydes" (*Toxicology and Applied Pharmacology*, vol. 2, no. 2, March, 1960, pp. 183–7).

Salem, H., Lucas, G. H. W. and Lucas, D. M. "Saran Plastic Bags as Containers for Breath Samples" (*Canadian Medical Association Journal*, vol. 82, no. 13, March 26, 1960, pp. 682–3).

Sellers, E. A. "Somatic Effects of Ionizing Radiation" (*Canadian Journal of Biochemistry and Physiology*, vol. 38, no. 3, March, 1960, pp. 326–30).

——— "Symposium on the Biological Effects of Radiation: (*a*) Introduction (*b*) Questions and Discussion" (*ibid.*, pp. 311, 337–8).

——— "Work in Cold Environments: Cold and Its Influence on the Worker" (*Journal of Occupational Medicine*, vol. 2, no. 3, March, 1960, pp. 115–17).

PHYSIOLOGY

Under the direction of Professor Charles H. Best

In last year's report it was pointed out that the teaching programme is overtaxing the facilities available in this department. The increase in the number of students is attributable to larger classes in the various faculties other than Medicine. The gift of the Wellcome Trust and the allocation from the University which have made possible the completion of the Charles H. Best Institute, will provide a new large teaching laboratory in the Department of Physiology and some increase in research space.

Professor J. Campbell, as Secretary of the Physiological Society, reports that during the 1959–60 session, ten meetings of the Society were held. The speakers from the United States were: Dr. E. H. Ahrens, Jr., Rockefeller Institute for Medical Research; Dr. G. F. Cahill, Jr., The Peter Bent Brigham Hospital, Boston; Dr. E. J. Masoro, Tufts University; Dr. P. A. Thornton, Colorado State University, and Dr. Charity Waymouth, Roscoe B. Jackson Memorial Laboratory. Lectures were given by Dr. W. Creutzfeldt, University of Freiburg and Dr. R. H. Painter of the Connaught Medical Research Laboratories. Dr. Ahrens, Dr. Cahill, and Dr. Waymouth were appointed Visiting Lecturers by the School of Graduate Studies. We are grateful for this arrangement which made possible these meetings.

Research

Members of the staff have undertaken the following research work:

In Professor R. E. Haist's section, studies on shock secondary to injury included the effects of environmental temperature on glucose absorption and certain metabolic changes in previously *cold-acclimatized* shocked rats by Dr. Rosemary D. Hawkins, Mr. S. D. Livingstone and Miss A. L. Haxton. Mr. Livingstone also investigated the effect of high protein diets, diamox treatment and sodium guanylate on shock development, and observed the effect of environmental temperature and of previous cold-acclimatization on adrenal ascorbic acid levels in shocked rats. Dr. Hawkins and Miss G. V. Kovacs investigated the hypoglycaemic effects of tolbutamide after a period of insulin injections, and after adrenalectomy or the injection of dehydroergotamine or reserpine. Mr. S. Wong continued his work on plant extracts which were reputed to have antidiabetic effects, and on the hypoglycaemic effect of sodium mesoxalate. He also investigated the use of dithizone in islet volume estimation. Dr. M. A. Ashworth and Mr. J. Friedberg studied the circulation to the islets in the living mouse.

In Professor F. C. Monkhouse's section, Dr. Monkhouse and Mrs. S. Milojevic have studied changes in blood coagulation in dogs after rapid and extensive haemorrhage followed by transfusion with saline, dextran, and plasma. The change in fibrinogen level in rats, rabbits, and dogs following the slow infusion of thrombin and thromboplastin has been followed. Rabbits and dogs have been completely defibrinated without fatal embolism. Miss F. G. D. McClain and Mrs. J. E. Strachan have studied factors concerned with the release and utilization of clearing factor (lipoprotein lipase). The active fraction has been concentrated from postheparin dog plasma. Using rats as the experimental animals, Miss L. Lickley studied the lipemia resulting from injection of India ink and concluded that it was induced by the shellac in the ink. This finding may prove useful in the study of fat mobilization.

In Professor J. Campbell's section, Mr. H. Socol and Mr. G. R. Green have studied factors that influence the rates of production and utilization of citrate by tissues *in vitro*. They have also tested liver function in animals exposed to cold. Dr. A. D. Martucci, Mr. Socol, and Mr. Green have studied the effects of various factors on the production of non-esterified fatty acids by rat epididymal fat tissue *in vitro*. With Mrs. V. Lazdins, effects of hypophysectomy on animals made permanently diabetic by growth hormone have been investigated. Dr. H. R. Hausler has continued his studies on the ocular complications of diabetes, assisted by Dr. T. M. Sibay. His report which will appear in more detail under the Department of Ophthalmology may be summarized as follows: Present work is aimed toward production of a "standard" diabetic retinopathy in rats and is intended to provide the experimental basis for a more effective therapeutic approach to this important eye complication.

In the past year, Professor J. Markowitz has been working on a simplified method of transtemporal hypophysectomy in the dog which might be suitable for the inexperienced operator. In addition, with his colleagues at Guelph, he has been studying the factors necessary for the prolonged survival of a visceral organism and those governing the presence and absence of clostrida in the canine liver.

In Professor J. W. Scott's section, Mr. K. E. Money has continued his studies of vestibular function and motion sickness. This has involved assaying antidiuretic hormone during vestibular stimulation. The earlier portion of this work was submitted as a thesis for which Mr. Money was awarded the M.A. degree at the 1959 spring convocation. Mr. R. G. Black has continued his studies of nerve action potentials. He has constructed, tested, and used the electronic stimulating and recording equipment for observing nerve impulses. In conjunction with Dr. I. M. Turnbull he has completed an important investigation of reflex efferent impulses in the trigeminal nerve.

In Professor A. M. Rappaport's section, Dr. P. Potvin has demonstrated that the route of ammonium salt infusion affects the rate of its detoxication by the liver. Ammonia metabolism is greatest when its salts enter the liver through the hepatic artery. Dr. J. Kohari, Dr. Peggy L. E. Ross, and Dr. Rappaport carried out experiments to replace one leaflet of the mitral valve by a pediculated flap, using hypothermia and extracorporeal circulation in open heart surgery. Dr. Ross also studied the effect of prolonged continuous portal infusion of a vitamin C + P solution on the liver of rats intoxicated with high doses of bromobenzene. Dr. Rappaport, in co-operation with Dr. D. L. J. Bilbey (Department of Anatomy), has studied the segmentation of the liver at microscopic level. The smallest segment is a microscopic clump of parenchyma around the terminal afferent nutrient vessels and represents the structural and functional unit of the liver. An exhibit on liver structure was represented at the Seventh International Anatomical Congress in New York in April, 1960.

In Professor D. W. Clarke's section, Miss L. E. Sexsmith has continued studies on DBI, an oral hypoglycaemic agent. She has measured its influence on the glucose uptake of isolated hemidiaphragms, and has found that it stimulates glucose uptake only when present in high concentrations. On the other hand, even quite small concentrations will depress glucose utilization by the epididymal fat pad. Its mode of action in the body thus continues to be unexplained to the satisfaction of all workers. Miss C. A. Miller has been working on an improved experimental procedure for the assay of insulin in circulating blood, by measuring the influence of minute amounts of this hormone on the glucose uptake of the epididymal fat pad.

In Professor O. Sirek's section, the behaviour of blood-glycoprotein fractions in offspring of alloxan diabetic rabbits, as well as in infants of diabetic mothers, has been studied in collaboration with Dr. Anna Sirek and with the technical assistance of Miss D. L. Muirhead. The results indicate that the levels show correlation with body growth.

Dr. W. J. Linghorne is continuing his study of osteogenic repair. A new method of restoring lost periodontal joint structure in dogs that gives promise of being useful clinically in the treatment of periodontal disease has been developed. The study of the nature of the reparative process by the use of polyethylene tubes in experimentally-produced gaps in the fibulae of dogs is being continued.

Graduate students have completed the following theses:

For the M.A. degree:

Livingstone, S. D. Some effects of previous cold acclimatization on metabolic changes in shock secondary to injury.

Sharma, B. B. Effects of hormones on the growth and activity of endocrine glands.

Taylor, W. J. R. Cardiovascular changes with vestibular stimulation.

Wong, S. A. Estimation of islet weight in the rat. B. Studies on certain extracts and substances with reported antidiabetic activity.

For the Ph.D. degree:

Sirek, Mrs. Anna. Studies on pancreatectomized and Houssay animals. The effects of hypoglycaemic sulfonylureas in dogs.

Publications

Best, C. H. "Diabetes since 1920" (*Canadian Medical Association Journal*, vol. 82, May 21, 1960, pp. 1061–6).

——— "Epochs in the History of Diabetes"; in *Diabetes*, ed. Robert H. Williams, pp. 1–13. New York: Paul B. Hoeber, Inc. 1960.

——— "Unfinished Researches" (*Quarterly Bulletin, Northwestern University Medical School Chicago*, vol. 33, no. 4, winter quarter, 1959, p. 300).

Campbell, J. "Instrument for Withdrawal and Proportioning of Fluids" (*Canadian Journal of Biochemistry and Physiology*, vol. 37, no. 11, Nov., 1959, pp. 1386–7).

Campbell, J., Chaikof, L., Wrenshall, G. A. and Zemel, R. "Effects of Growth Hormone on Metabolic and Endocrine Factors in Hypophysectomized Dogs" (*Canadian Journal of Biochemistry and Physiology*, vol. 37, no. 11, Nov., 1959, pp. 1313–27).

Campbell, J., Green, G. R., Schönbaum, E. and Socol, H. "Effects of Exposure to Cold and of Diet on Coenzyme A Levels in Tissues" (*Canadian Journal of Biochemistry and Physiology*, vol. 38, no. 1, Jan., 1960, pp. 175–85).

Campbell, J., Green, G. R. and Socol, H. "Effects of Exposure to Cold on Acetylation in the Rat" (*Canadian Journal of Biochemistry and Physiology*, vol. 38, no. 2, Feb., 1960, pp. 171–4).

Clarke, D. W. "The Mode of Action of Oral Hypoglycemic Agents" (*Revue canadienne de biologie*, vol. 18, Sept., 1959, pp. 289–303).

Clarke, D. W. and Evans, R. L. "The Influence of Ethyl Alcohol on the Oxygen Consumption of Cerebral Slices" (*Canadian Journal of Biochemistry and Physiology*, vol. 37, no. 12, Dec., 1959, pp. 1525–6).

——— "The Influence of Alcohol upon Carbohydrate Metabolism in the Liver and in Isolated Diaphragms" (*Quarterly Journal of Studies on Alcohol*, vol. 21, March, 1960, pp. 13–22).

Clarke, D. W. and Forbath, N. "Some Studies on the Mode of Action of DBI" (*Metabolism*, vol. 8, no. 4, Part II, July, 1959, pp. 553–6).

Forbath, N. and Clarke, D. W. "The Effect of Phenethylbiguanide upon the Metabolism of the Isolated Rat Diaphragm" (*Canadian Journal of Biochemistry and Physiology*, vol. 37, no. 7, July, 1959, pp. 881–6).

——— "Factors Influencing the Distribution of Pentoses in the Isolated Rat Diaphragm" (*Canadian Journal of Biochemistry and Physiology*, vol. 38, no. 1, Jan., 1960, pp. 13–17).

Goranson, E. S., McCulloch, E. A. and Cinits, E. A. "The Effect of Whole-body X-Irradiation on an Alpha-Globulin Component in the Serum of C_3H_f/HEHA Mice" (*Radiation Research*, vol. 12, no. 5, May, 1960, pp. 560–6).

Haist, R. E. "Influence of Environment on the Metabolic Response to Injury" in *The Biochemical Response to Injury,* ed. H. B. Stoner, pp. 313–40. Oxford: Blackwell Scientific Publications. 1960.

——"Islet Cell Function" (*Annals of the New York Academy of Sciences,* vol. 82, art. 2, Sept., 1959, pp. 266–86).

Haist, R. E., Hawkins, R. D. and Kovacs, G. V. "Effect of Environmental Temperature on Metabolic Changes following Physical Injury" (*Journal of Applied Physiology,* vol. 15, no. 1, Jan., 1960, pp. 13–17).

Hawkins, R. D., Ashworth, M. A., Schachter, H. and Haist, R. E. "Effect of Continuous Glucose Infusion on the Glucose-6-phosphatase Activity of the Liver in Rats" (*New England Journal of Medicine,* vol. 261, Aug. 27, 1959, pp. 434–7).

Linghorne, W. J. "Estudios sobre reinserción y regeneración" (*Revista de la Asociación Odontologica Argentina,* vol. 47, no. 6, June, 1959, pp. 238–45).

—— "The Sequence of Events in Osteogenesis as studied in Polyethylene Tubes" (*Annals of the New York Academy of Sciences,* vol. 85, art. 1, March, 1960, pp. 445–60).

Markowitz, J., Archibald, J. and Downie, H. G. *Experimental Surgery,* 4th ed. Baltimore: Williams and Wilkins Co. 1959. Pp. 931.

Monkhouse, F. C. "Blood Coagulation and Lipid Metabolism" (*American Journal of Clinical Nutrition,* vol. 8, Jan.-Feb., 1960, pp. 1–6).

—— "Relationship between Antithrombin and Thrombin Levels in Plasma and Serum" (*American Journal of Physiology,* vol. 197, no. 5, Nov., 1959, pp. 984–8).

Monkhouse, F. C., McClain, F. and Baker, D. G. "Action of Protamine on Production and Activity of Heparin-induced Clearing Factor" (*Proceedings of the Society for Experimental Biology and Medicine,* vol. 102, 1959, pp. 50–53).

Monkhouse, F. C. and Milojevic, S. "Changes in Thrombin Generation and Antithrombin Titer following Massive Bleeding and Transfusion in Dogs" (*Canadian Journal of Biochemistry and Physiology,* vol. 38, no. 5, May, 1960, pp. 475–80).

Rappaport, A. M. "Betrachtungen zur Pathophysiologie der Leberstruktur" (*Klinische Wochenschrift,* vol. 38, no. 12, June, 1960, pp. 561–77).

Sirek, O. V. and Sirek, A. "A Low Concentration of Certain Blood Constituents Observed in Offspring of Alloxan-Diabetic Rabbits" (*Nature,* vol. 184, Aug. 8, 1959, pp. 456–7).

PSYCHIATRY

Under the direction of Professor A. B. Stokes

The academic year 1959–60 is likely to be a notable time mark in the history of the Department of Psychiatry. The building of a new Psychiatric Hospital and Institute has been authorized by the provincial government; planning is proceeding as a collaborative endeavour of the Department of Health and the University. An excellent site has been selected adjacent to the west campus, the architect has been appointed, and working committees are already very active in defining needs and functional relationships. A unique opportunity for a forward movement in Psychiatry has followed on the wise direction and generous concern of governmental and University leaders.

Psychiatry is frequently described as a new medical discipline whereas in fact it is among the oldest. In Toronto when the teaching of medicine was part of the curriculum of King's College, psychiatry had representation among the medical studies. When the Faculty of Medicine was revived within the University of Toronto in 1887, Dr. Daniel Clark was appointed extramural professor of Medical Psychology: he was followed by Dr. J. C. Mitchell, Dr. N. H. Bumer, and Dr. C. K. Clarke. In 1906 Dr. C. K. Clarke was appointed Professor of Psychiatry to be succeeded in 1925 by Dr. C. B. Farrar, the present distinguished and beloved Professor Emeritus. Over the span of a century these very able men, highly trained in the scientific techniques of their day, *studied* the problems of mental disorder in Toronto and contributed to the slow evolution of Psychiatry as an applied science as well as a practised art.

Over the years the Ontario Hospital Queen Street had been a rich source of clinical material but no doubt the service pressures, the nineteenth-century lunatic notions attached to mental disorder, the rejective procedures of commitment as well as the special difficulties of research into mental functioning, were deterrents to precise enquiries on causation, control, and prevention. However at a time when the basic sciences were insufficiently developed for application to the problems of disturbed mentation, preparatory measures for such a scientific development were being taken. At the Toronto General Hospital in 1906, Dr. Campbell Meyers had organized a twelve-bed unit for functional and nervous disorders. In 1915 Dr. C. K. Clarke reported on the work of a forty-five-bed Reception Hospital housed in a building of the old General Hospital: at the same time he commented on the operation of a Feeble-Minded Clinic at the General Hospital where it was possible to study family, environment, and social conditions leading up to the development both of imbecility and early psychoses. In these communications Dr. Clarke clearly envisaged a psychiatric hospital containing an equipped division of abnormal psychology and chemico-pathological laboratories working in co-operation with other University and General Hospital laboratories. This vision was realized when the Toronto Psychiatric Hospital was built thirty-five years ago.

In 1926 the Toronto Psychiatric Hospital became a University teaching hospital: its medical services were under the direction of Dr. C. B. Farrar who was also Professor of Psychiatry and Head of the Department of Psychiatry at the University of Toronto. Both undergraduate and graduate instruction in Psychiatry were emphatically revised. Young doctors had something more than a limited number of didactic lectures on insanity to support them in their subsequent practice: young psychiatrists no longer were limited to "learning on the job." Apprenticeship of the right kind was vitalized by educational questioning, by knowledge resource, and by the application of scientific method. Under Dr. Farrar, Hospital and University were wedded and with consummatory aspiration developed a healthy mutant of the older Psychiatry.

The modern version of a university-begotten Psychiatry requires exemplary clinical services covering the whole sweep of psychiatric illness and disability, the best educational arrangements for the communication of what is known, and the greatest opportunity for continued research enquiry into areas of ignorance. Over the past twenty years the development of this kind of matrix in Toronto has outgrown the containing physical facilities. The new Hospital and Institute will supply a much needed expansion of physical resources: but even more importantly they will symbolize continuous devoted efforts at applying scientific intelligence to resolve the illness problems of gravely disabled psychiatric patients.

Dr. C. B. Farrar was the guest of honour at a dinner given by past students, colleagues, friends, and admirers on November 27, 1959: Dr. Farrar's portrait was presented to him during the celebrations which marked his eighty-fifth birthday.

During the academic year 1959–60, the undergraduate courses of instruction were revised in terms of detail. The principle of instructing third- and fourth-year students in the ways of utilizing the doctor-patient relationship for psychotherapeutic purposes, was still further developed. It is becoming increasingly evident that a strengthening of the first and second year's courses is necessary. The standard of the final examinations was moderate only.

The graduate instruction over the academic year 1959–60 was facilitated by the establishment of internships in the Psychiatric Divisions of the Teaching General Hospitals. The development is encouraging insofar as it allows the closer educational integration of General Hospital psychiatry with the Toronto Psychiatric Hospital and the Ontario Hospital, Toronto. Fifty-three graduate students were enrolled with the Department of Psychiatry—their assignments under University teachers were spread over sixteen clinical services. In the graduate examinations sixteen senior students were successful in their Diploma of Psychiatry examination. Of past diplomates sixteen obtained the certification examinations of the Royal College: two were elected to the Fellowship of the Royal College by examination. The graduate division requires further strengthening in the third and fourth years, particularly in the areas of concentrated study and research enquiry.

One developing area of concentrated third- and fourth-year study is that of Child Psychiatry. A University committee including representation from other University divisions (particularly the Department of Paediatrics and the Institute of Child Study) has organized a two-year experience in the children's field. Five graduate physicians, with two years of experience in adult psychiatry, have been enrolled and assigned to training posts at the Toronto Psychiatric Hospital and the Thistletown Hospital. The Provincial Department of Health has enthusiastically encouraged and generously supported this advance.

Mental defect is another psychiatric area in which the Department of Psychiatry's interest has been engaged. The children's services of the Toronto Psychiatric Hospital have developed arrangements whereby an individual appraisal of retardation and its attendant family and educational problems is offered. The appraisal is associated with guidance and home support. Very importantly a concentrated research effort into the causes of mental defect, particularly as related to intra-uterine events, is under way. The growth of interest and effort in the neglected area of mental deficiency has been under the aegis of the Group for the Scientific Study of Mental Retardation. Generous funds have been made available from this voluntary association under the chairmanship of Mr. Charles L. Gundy.

Over the year many members of the academic staff have delivered lectures or contributed to seminars in other universities both in Canada and abroad. Over the same period many distinguished visitors have given of their experience and thought as contributions to the ongoing work of the Department of Psychiatry. Such increasing academic interchange is a healthy index of the University's contribution to psychiatric knowledge.

Another index, equally pertinent, is the growth of library facilities. The library is generously financed by the Provincial Department of Health: a library committee has worked hard to achieve a concentration of psychiatric literature of the highest standard.

It is a pleasure to acknowledge a widening support of the work of the department in terms of interest, guidance, and finance. In addition to the thankful references already made, appreciation is expressed here to the Council of the Faculty of Medicine, the Postgraduate Division of the Medical Faculty, the Academic Council of the Department, the Medical Alumni Association, the Teaching General Hospitals, the McLaughlin Foundation, the McLean Foundation, and to a large number of friends and donors in private life.

Research

Research activity within the field of biological psychiatry has been burgeoning during the past academic year. Under the direction of Dr. J. W. Lovett Doust a number of new programmes have been initiated, among them a focussing upon the reticular activating system of the brain-stem and other pacemaking mechanisms which serve to regulate various activities of the organism resulting in consciousness and behaviour.

With Dr. C. Gregory, Mr. I. Podnieks, and Mrs. E. Fox, the temporal sequence of a number of autonomic, metabolic, and sensory perceptual as well as central nervous system correlates of spontaneous biological activity are being investigated and the conditions determining their frequencies and amplitudes sought. Spontaneous non-specific activity is seemingly capable of being monitored in ANS as efficiently as in CNS effector systems in man and its frequency characteristics have been found to be rather consistently changed in the schizophrenias and certain other psychiatric disorders in the resting condition. This work is being pursued and the effects of surprise, pain, perceptual isolation, and other stresses are also being investigated.

With Dr. J. W. Fotheringham and the collaboration of Professor D. E. Cannell, and assisted by a grant from the Group for the Scientific Study of Mental Retardation, the physiological climate of the foetus *in utero* is being studied in an effort to determine the extent to which emotional factors in the pregnant woman may influence the unborn child. Previous work from our laboratories has demonstrated a capillary hypoxaemia and tissue cell anoxia in association with emotion and, if these are transmitted to the foetus, it is possible that strong and long continued maternal emotional states may damage or decelerate foetal development. Simultaneous recordings of maternal and foetal EKG and EEG are accordingly being made longitudinally throughout pregnancy and the effect, emotions, and behaviour of the mother are followed closely with a variety of clinical, psychological, and physiological measures.

Dr. P. Melville has initiated a study of the effect of ethnic and cultural factors in the determination of psychiatric and psychosomatic breakdown, using patients seen in the out-patient clinic of the Toronto General Hospital for his case material. In the Psychiatric Hospital, the former small metabolic facility has been expanded into a Clinical Research Unit of six beds. Investigation of periodic mental illness continues in this setting but the scope of the unit's activities has been widened. With Dr. C. Ezrin, Dr. P. Walfish and Miss A. Britton an interesting anomaly in the day by day utilization of tagged thyroxine compounds has been found in certain of these patients with recurrent illness at critical epochs of their serial disturbance and is being intensively studied.

Mr. B. Eglitis has criticized the Lund, Cohen and Goldenberg von Euler, and Weil-Malherbe and Bond chemical techniques for estimating catechol amines in body fluids of man. He has devised a new spectrofluorometric method for this analysis which, in urine, has a working error of about 8 per cent. It is hoped that this new technique will be applied to the measurement of adrenaline, nor-adrenaline, and other pressor-amines output in patients with periodic catatonia and similar psychiatric periodic and recurrent disturbances.

In the clinical settings of the Psychiatric Hospital Day-Care Centre, St. Michael's Hospital, and the Ontario Hospitals at Toronto and Whitby, Drs. A. Jones, D. J. Lewis, A. Miller, W. Kyne, E. Baker, and P. G. Lynes respectively have been operating a Drug Research Unit under the aegis of the University-Provincial Drug Research Committee, chaired by Dr. J. W. Lovett Doust. An experimental psychologist, Mr. R. L. D. Wright is attached to the unit for the purpose of objectively testing the effects of the drugs on patients and Professor D. A. Sprott of the Department of Mathematics, University of Waterloo, is honorary consultant in biostatistics to the committee. Employing exemplary experimental designs and the help of specially trained nursing teams at the co-operating hospitals, the Unit has screened such antidepressant agents as Tofranil (Geigy) and Niamid (Pfizer); phenothiazines as Mellaril (Sandoz), Stelazine (SKF) and Quide (Pitman-Moore); reserpine analogues as tetrabenazine (Roche); meprobamate analogues as W-141 (Frosst); and a number of other agents including Vastran and Klestrol (Denver Chemical), Hydergine (Sandoz), Vasculat (Boehringer), etc. Double-blind techniques are used and the effects of new drugs are measured against both placebos and standard referent agents such as Largactil (Poulenc), Serpasil (Ciba) and sodium amytal (Lilly) whose effects have been well investigated.

In a series of more pointed psychopharmacological experiments, Dr. R. W. Harrington and Dr. J. W. Lovett Doust have devised a new technique for measuring the central pacemaking function of the reticular activating system of the brain-stem in man. Their work has revealed a new method of objectively monitoring the influence of psychotropic drugs on this system and also of providing a means of studying perceptual deficits in schizophrenia and other psychiatric disturbances.

In the clinical research unit recently established at the Ontario Hospital, Toronto, Dr. D. Naidoo is studying premenstrual tension as a recurring disorder of mood associated with changes in hormonal, electrolyte, and water balance. In a parallel project, preparatory, cytological studies on the effect of hormones and of histamine on the exfoliative vaginal epithelium of rats have been made in collaboration with the Department of Anatomy. Multivariate methods of data analysis are being worked out in conjunction with Dr. D. Sprott.

Psychological researches continue actively. Dr. Bruce Quarrington with Mr. E. Douglass pursues the dimensional analysis of stutterers using factor analytic methods. From the same data a series of studies are progressing, which examine the clinical significance of the adaptation phenomenon in stuttering. Several experiments have been designed to test the applications of learning theory to adaptation and stuttering in general. The extent to which auditory masking (white noise) facilitates various speech and motor activities in stutterers is being investigated. Dr. S. Neiger and his group continue their studies of the Rorschach test: they are designed to produce objective scales of regression, pathological thinking, and reality contact. A truly representative normal sample has been collected for comparison purposes. Mr. W. Currie has been scrutinizing the personality characteristics of normal subjects who show, or fail to show, evidence of repression in a conditioning experiment. In the Forensic Clinic Dr. H. C. Hutchison and Mr. O. White have completed a survey of personality traits in normal, neurotic, and sexual deviate groups. With Dr. I. Boyd, Dr. Hutchison has applied reciprocal inhibition therapy to exhibitionist offenders. Mr. D. Paitich has continued his researches into parent-child relationships of sexual deviates. All these enquiries are beginning to throw light on the vexing problems of sexual offences.

In the area of psychodynamics and psychopathology Dr. D. Cappon has continued his enquiry into the dreams of patients suffering physical illnesses. He has found that deprivation of sensory modality by disease or accident does not lead to a decreased representation of that modality in sleep dreams. Where there is visceral disease there is an increase of visceral elements in the sleep dreams: the frequency and specificity of somatic references in the dreams varied with the site of the lesion: they seemed to be unaffected by emotional adjustment to the physical illness. There was a suggestive indication that sleep dreams occasionally anticipate the clinical somatic event. Dr. Cappon with Mr. R. Banks has moved from the study of sleep dreams to an enquiry into perceptual organization as this relates to awareness and to the oneiric process.

Clinical investigations have continued actively. Dr. W. Mitchell is following up into adult years a large group of children and adolescents admitted to the Toronto Psychiatric Hospital. Dr. A. Miller is reviewing the results of lobotomy ten years after operation. Dr. R. E. Turner is undertaking a survey of pre-sentence cases referred to the Forensic Clinic from the courts over the past four years. Dr. D. J. Lewis has undertaken an enquiry into the personalized hallucinations of psychotic or borderline patients admitted to St. Michael's Hospital. Dr. D. J. McCulloch and Mr. J. C. Stewart have reported from the Ontario Hospital, Toronto, on "Sexual Norms in a Psychiatric Population." With Dr. S. J. J. Freeman and Miss E. J. Leavens, Dr. McCulloch has followed up fifty married couples seeking psychiatric help and treated largely by group methods. Mr. D. M. Graham has reported on "Psychiatric Decisions and the Social Class of Patients." The results of a research into factors associated with change in patients undergoing psychotherapy at the Ontario Hospital, Outpatient Clinic, Toronto, are being processed.

These and other ongoing studies have contributed not only specifically but also generally to the climate of work in the Department of Psychiatry. Enthusiasm has been generated and self-criticism sharpened by research presentations within the academic milieu. Such efforts draw on resource and for this, sincere thanks are offered to University colleagues, the Provincial Department of Health, and the Federal-Provincial Mental Health Grant authorities.

Publications

Armstrong, J. D. "Alcohol, Amnesia and Awareness: A Critique" (*Quarterly Journal of Studies on Alcohol*, vol. 20, no. 4, Dec., 1959, pp. 781–2).

——— "Alcoholism—A Social Dilemma" (*Journal of Social Therapy*, vol. 5, no. 3, 3rd quarter, 1959, pp. 199–208).

——— "Doctor Views Drugs in Perspective as Part of Alcoholism" (*Alcoholism: Research, Treatment, Education*, vol. 6, no. 2, July, 1959, pp. 5–9).

Baker, E. F. W. "The Mental Hospital Patient in Canada" (*Canadian Medical Association Journal*, vol. 82, no. 14, April 2, 1960, p. 733).

Brown, Jean. "Psychological Department Staff Meetings at Toronto Psychiatric Hospital" (*Ontario Hospital Psychologists Bulletin*, vol. 5, no. 2, Aug., 1959, pp. 14–15).

Cappon, D. "The Dying" (*Psychiatric Quarterly*, vol. 33, no. 3, July, 1959, pp. 466–89).

——— "Morphology and Other Parameters of Phantasy in the Schizophrenias" (*Archives of General Psychiatry*, vol. 1, no. 1, July, 1959, pp. 17–34).

Cappon, D. and Banks, R. "Preliminary Study of Endurance and Perceptual Change in Sleep Deprivation" (*Perceptual and Motor Skills*, vol. 10, Feb., 1960, pp. 99–104).

——— "Studies in Perceptual Distortion" (*Archives of General Psychiatry*, vol. 2, no. 3, March, 1960, pp. 346–9).

Dewan, J. G. "Modern Concepts of Treatment—Individual Therapy" (*Canadian Hospital*, vol. 37, no. 2, Feb., 1960, pp. 42–44).

Farrar, C. B. "The Four Doctors"; in *Proceedings of 7th Annual Meeting of New Jersey Neuro-psychiatric Institute, 1960*, pp. 105–16. Princeton: N.J. Neuro-psychiatric Institute.

——— "Psychiatry" in *New International Year Book*, pp. 355–7. New York: Funk & Wagnalls Company. 1960.

Gray, K. G. "The British Mental Health Act, 1959" (*Canadian Psychiatric Association Journal*, vol. 5, no. 1, pp. 30–32).

——— "Legislation and Mental Illness" (*Canadian Hospital*, vol. 37, no. 3, March, 1960, pp. 49, 94).

——— "The Role of the Psychiatrist"; in *Jury Trials*, Law Society of Upper Canada, Special Lectures, pp. 33–40. Toronto: Richard de Boo. 1959.

Hutchison, H. C. "Group Techniques with Wives of Sexual Deviates" (*Canada's Mental Health*, vol. 7, no. 8, Oct., 1959, p. 6).

Jones, A. L. "Occupational Therapy in a Day Hospital" (*Canadian Journal of Occupational Therapy*, vol. 27, no. 1, March, 1960, pp. 5–8).

Jones, A. L. and Goodman, M. "Group Work in a Day Care Hospital" (*Social Worker*, vol. 28, 1960, p. 34).

Kay, Marion. "Toward an Understanding of the Troubled and Troublesome Adolescent" (*Canadian Journal of Corrections*, vol. 1, no. 5, Oct., 1959, pp. 6–11).

Lewis, D. J. "Looking Back on Leukotomy" (*Canadian Psychiatric Association Journal*, vol. 4, no. 4, pp. 230–1).

Lovett Doust, J. W. "Recent Investigations in Selected Aspects of the Physiological Dimensions and the Implications for Prevention"; in *Recent Contributions of Biological and Psychological Investigations to Preventive Psychiatry*, ed. R. H. Ojemann, pp. 45–60. Iowa: State University of Iowa Press. 1959.

——— "Serotonin and Sanity: A Review of Progress" (*Modern Medicine of Canada*, vol. 14, no. 11, Nov., 1959, pp. 103–8).

Lovett Doust, J. W., Lewis, D. J., Miller, A., Sprott, D. and Wright, R. L. D. "Controlled Assessment of Antidepressant Drugs, including Tofranil" (*Canadian Psychiatric Association Journal*, vol. 4, special supplement, 1959, pp. S190–4).

Miller, A. "The Changing Mental Hospital" (*Canadian Hospital*, vol. 37, no. 2, Feb., 1960, pp. 39–41).

——— "A Report on Psychiatric Emergencies" (*ibid.*, vol. 36, no. 12, Dec., 1959, pp. 36–7).

Mitchell, W. R. "The General Practitioner and the Diagnosis of Pre-psychotic Conditions" (*Canadian Medical Association Journal*, vol. 81, no. 5, Sept. 1, 1959, pp. 402–7).

Naidoo, D. "Histochemie der Fermente in Zentralen und Peripheren Nervensystem"; in *Handbuch der Histochemie*, ed. W. Graumann and K. Neumann, vol. 7, Sec. 2, pp. 112–267. Stuttgart: Gustav Fischer Verlag. 1960.

Neiger, S. "Frequent Rorschach Responses in the Toronto Area and their Comparison with Responses from Other Areas" (*Ontario Hospital Psychologists Bulletin*, vol. 5, no. 3, Dec., 1959, pp. 10–24).

Paitich, D. "Diagnostic Problems in Research with Homosexuals" (*Ontario Hospital Psychologists Bulletin*, vol. 5, no. 1, April, 1959, pp. 7–9).

Perretz, E. A. "The Use of Volunteers in the Mental Health Services" (*Social Worker*, vol. 27, no. 3, June, 1959, pp. 65–70).

——— "The Volunteer in Psychiatric Service" (*Canadian Hospital*, vol. 37, no. 3, March, 1960, pp. 51–52, 88).

Quarrington, B. "The Centre for Advanced Studies in the Behavioral Sciences" (*Ontario Hospital Psychologists Bulletin*, vol. 5, no. 2, Aug., 1959, pp. 9–13).

Seeley, J. "The Forest Hill Village 'Human Relations Classes' "; in *Basic Approaches to Mental Health in the Schools*, pp. 38–47. Washington: American Personnel and Guidance Association.

——— "How Many Alcoholics? Under Review" (*Alcoholism Research Treatment, Education*, vol. 6, no. 3, Oct., 1959, pp. 7–8).

——— "The Social Sea around Us" (*School Review*, winter, 1959, pp. 422–34).

——— "Some Radical Problems of Intergroup Relations"; in *A People and Its Faith*, ed. A. Rose, pp. 85–102. Toronto: University of Toronto Press. 1959.

Seeley, J., Gibbins, R. J. and Smart, R. G. "A Critique of the Manson Evaluation Test" (*Quarterly Journal of Studies on Alcohol*, vol. 20, no. 2, June, 1959, pp. 357–61).

Stokes, A. B. Discussion of: "Psychodynamics and Psychotherapy of Depression" by Paul Hoch (*Canadian Psychiatric Association Journal*, vol. 4, special supplement, 1959, p. S30).

——— "Psychosomatic Notions—A Review"; in *Medicine and Other Disciplines*, ed. I. Galdston, pp. 163–79. New York: International Universities Press. 1960.

——— "Research in Mental Disorder" (*Canadian Hospital*, vol. 37, no. 2, Feb., 1960, pp. 48–9, 74).

Turner, R. E. "The Forensic Clinic, Toronto" (*Criminal Law Quarterly*, vol. 2, no. 4, Feb., 1960, pp. 437–48).

Walters, A. "The Differentiation of Causalgia and Hyperpathia" (*Canadian Medical Association Journal*, vol. 80, no. 2, Jan. 15, 1959, pp. 105–9).

White, O. Review, *Ontario Hospital Psychologists Bulletin*, vol. 5, no. 2, Aug., 1959, pp. 16–17.

RADIOLOGY

Under the direction of Professor A. C. Singleton

There has been no essential change in the undergraduate or postgraduate teaching in the department during the last year. Reorganization of the didactic lectures to the third year has, I think, resulted in a better type of coverage of the subject at this level. The fourth-year clinics in Radiology and the medical and surgical groups in the teaching hospitals have continued to hold the interest of the students and have, I think, proven to be quite valuable.

The joint teaching of radiology with obstetrics in the University hospitals has also been well received and is of value. Addition of two clinical teachers to the staff of St. Michael's Hospital a year ago has greatly improved the efficiency of teaching in that hospital and it is anticipated that a further certified radiologist will be added to the staff of St. Michael's Hospital this coming autumn. An addition to the teaching staff of the Toronto General Hospital will be Dr. R. M. Parrish who joins the department this coming session.

The postgraduate course, being the diploma of Medical Radiology of the University, continues to attract a goodly number of candidates and it is with pleasure that I report that there were ten successful candidates for this diploma at the June Convocation, the highest number which we have ever had.

Research

Dr. D. E. Sanders with Drs. Norman Delarue and George Lau of the Department of Surgery have been carrying out research on "Pulmonary Angiography in Bronchial Carcinoma." This research has been completed and the material is being analysed for publication.

Dr. D. E. Sanders, with Dr. J. A. Low of the Department of Obstetrics and Gynaecology have completed their research on "Cystourethrography in Stress Incontinence." This material is now being analysed for publication.

Dr. R. B. Holmes is continuing his study of "Infundibular Region of the Right Ventricle" with reference to anatomic stenosis and to work hypertrophy by angiocardiography.

Dr. H. E. Meema is continuing his research on the relative bone density as seen radiographically for the purpose of estimating osteoporosis.

Dr. J. D. Munn of the Hospital for Sick Children is investigating "Congenital Dislocation of the Hip in Children" in correlation with the Genetic Department.

Dr. C. A. F. Möes has undertaken research into the subject of "Diastematolmyelia" as seen in the Hospital for Sick Children. Further research is being carried out on hypertrophic pyloric stenosis in children and during the year Dr. K. E. Hodge *et al.* have been investigating the problem of excretion urography in the older age group and his associates have also conducted research into the appearance of the normal duodenal cap. Dr. Hodge is also conducting research into the Seldinger-percutaneous catheter replacement technique for aortic angiography.

Reported by Professor C. L. Ash

A controlled study is being made of the relative effectiveness of Cobalt-60 teletherapy and 24 Mev X-rays (betatron) in the treatment of cancer of the cervix—stages 11B and 111. It will take another two years to bring the required number of cases to one hundred. Along similar lines a comparison is being made of long- and short-term radiation therapy in inoperable lung cancer. Studies to date indicate that palliative therapy given as a tumour dose of 2,000 r in four days may be as effective as 3,500 r given over a period of three weeks. In studies such as cancer of the cervix mentioned above, ordinarily at least five years must elapse before results can be assessed. It is hoped that this period of waiting can be circumvented by the application of Boag's system of predicting survival and to this end, as a statistical study, experience with 3,000 cases of cervical cancer is being analysed according to Boag's mathematical method.

Bone marrow transfusion, as an adjunct to treatment with radiation or chemotherapy, has been used in five cases, three of which had acute leukaemia. Results to date have been disappointing. Disturbances of calcium metabolism in malignant disease have continued to take a prominent part in clinical studies and work has been initiated on the difficult problem of the systemic effects of acute radiation. In recent years increasing attention has been directed to the phenomenon of host resistance as manifest in different forms of malignant disease. The malignant lymphomas, including Hodgkin's disease, are being made the subject of special immunological studies. As matters of very practical interest special studies are being made of malignant effusions and of the value of intrathecal phenol for the control of intractable pain.

An arrangement has been completed for the addition to the staff of a physician with special training in metabolism.

SURGERY

Under the direction of Professor F. G. Kergin

There has been no significant change in undergraduate teaching during the past year. As more and more diseases have proved amenable to surgical treatment, there has been increasing overlap of medical and surgical interest and teaching, at times to the confusion of the student. The vertical type of division of patients into "medical" or "surgical" is no longer possible. Increasingly, the care of patients is a team effort involving the interest of physician, surgeon, radiologist, pathologist, and perhaps others. If, on different occasions, each member of the team instructs students about any particular disease from his specialized point of view, there is bound to be waste of the student's time and, much worse still, confusion, and the suspicion that these various experts do not agree in the management of that disease. It is obvious that there must be a close and carefully planned integration of teaching by the clinical departments with, in certain areas, collaboration with basic science departments. This whole problem is under study; it is in this direction that the department looks for the next major change in teaching methods.

For some time undergraduate teaching in Obstetrics and Gynaecology and in Medicine has been given at the Women's College Hospital. During the year second-year surgical clinics were started in that hospital and were conducted very successfully by Dr. Jessie Gray, Dr. Marjorie Davis, and Dr. Olive Ibberson.

Appointments to the University of Toronto Postgraduate Training Course in Surgery continue to attract high-quality applicants from most of the medical schools in Canada. The department is inundated with enquiries from graduates of medical schools outside North America, many of whom have come to the United States for internship and have been disappointed in their efforts to find an opportunity in that country for surgical training. Foreign graduates are accepted for training, on a provisional basis, if they are sponsored by the Dean and Professor of Surgery of their medical school in the expectation that they will return to their own country to an academic position.

In November a new postgraduate course was launched. The members of the Department of Surgery of the Toronto General Hospital gave a course for general practitioners, the theme being the treatment of the injured patient. The course was well received; it is anticipated that a similar course will become an annual event.

Supported by a generous donation from private benefactors in February Dr. J. Evans, Professor of Neurosurgery at the University of Chicago, spent a week with the Division of Neurosurgery of the Toronto General Hospital, as a visiting Chief of Service. He entered fully into all the activities of the division and visited neurosurgical units in the other teaching hospitals; staff and residents alike received much stimulus from his visit.

In October Sir Eric Riches, Senior Surgeon of Middlesex Hospital, London, spent three days as a visitor to the department and gave a lecture to the senior students and residents on "Tumours of the Kidney."

The Balfour Lecture was given in April by Dr. Walter Maddock, Elcock Professor of Surgery of Northwestern University, Chicago, and Chairman of the Department of Surgery. He chose as his subject "Gastro-intestinal Distention—Etiology and Management" and emphasized particularly the diagnosis of intestinal obstruction and the dangers implicit in the misuse of long tubes in the management of intestinal distention.

During the year the laboratories of the Toronto Western Hospital for experimental surgery have come into full activity; basic investigation is being conducted by several members of the department on the staff of that hospital.

During the autumn Dr. Robert Salter spent several weeks on a teaching tour of mission hospitals in central Africa. He was awarded the Medal in Surgery of The Royal College of Physicians and Surgeons of Canada for his paper "An Experimental Investigation of the Effects of Continuous Compression on Living Articular Cartilage," which was read at the meeting of the college in Montreal.

Dr. C. A. Aberhart has succeeded Dr. J. A. MacFarlane as Director of Surgery at Sunnybrook Hospital and Dr. I. B. Macdonald has been appointed Chief Surgeon of the Wellesley Hospital. Dr. J. G. Evans has been appointed Clinical Teacher in the Department of Surgerv and Assistant Surgeon on the staff of the Orthopaedic Division of St. Michael's Hospital.

Research

Cardiovascular Surgery

Dr. W. G. Bigelow has directed a team, headed by Dr. S. Sidlofsky, in continued studies of the physiology of hibernation and its possible application to cardiac surgery. Further evidence of the endocrine control of this phenomenon has been obtained. Assistance in this work is being generously provided by the Division of Pure Chemistry of the National Research Council and in particular by Dr. O. Edwards and Dr. R. M. Jones of that division.

In collaboration with Dr. R. O. Heimbecker and Dr. J. A. Key clinical studies of the use of a heat exchanger in association with a pump oxygenator during open heart surgery have been made and the method used successfully in some sixty-five patients. A method of coronary artery perfusion for use during operations on the aortic valve has been perfected and techniques evolved for the surgical correction of mitral insufficiency, aortic stenosis, and aortic insufficiency.

Dr. J. A. Key has continued his assessment of synthetic materials for arterial grafting; he has also initiated studies of the effects of regional perfusion with fibrinolysin for occlusive arterial disease which is not suitable for direct surgical correction.

Dr. R. O. Heimbecker, assisted by Dr. A. Varga, has developed a technique for the transplantation of homograft heart valves from one animal to another and has obtained long-term survivals with excellent function of the donor valves.

Dr. D. R. Wilson, working in the experimental animal laboratory of the Toronto Western Hospital with the assistance of Dr. P. W. Aggett, has developed the technique of using a heart-lung machine for clinical use. Experiments are being conducted with aortic valve replacement by homografts. Clinical investigations of the post-phlebitic leg are being made using a cineradiographic technique and a new approach to therapy is evolving.

Dr. W. T. Mustard and Dr. G. A. Trusler, working in the Research Institute of the Hospital for Sick Children, with the assistance of Dr. Charles Bull, have continued a study of the natural history of aortic anastomoses in puppies. An experimental study has been made of the effect of cardiac output caused by decreasing the size of the atria in dogs. Experimental studies have been made of ways of inducing arterial spasm and of methods for relieving established spasm.

General Surgery

During the year Dr. D. J. Currie has completed his studies on the experimental production of cholecystitis.

Assisted by Dr. George Lau, Dr. N. C. Delarue has continued the randomized study of the effects of chemotherapy as an adjuvant to the surgical treatment of lung cancer. He and Dr. Lau, at the Toronto General Hospital, and Dr. Neil Watters at the Wellesley Hospital, have continued the study of the incidence and significance of circulating cancer cells in the blood of patients with malignant disease. Drs. W. Anderson and T. C. Brown, of the Department of Pathology, have collaborated in this investigation. With Dr. D. E. Sanders, of the Department of Radiology, an investigation of eighty patients with lung cancer has been completed to assess the value of pulmonary angiography as a means of determining resectability.

At the women's College Hospital Dr. Olive Ibberson is conducting a clinical study of the results obtained in the treatment of cancer of the breast in that hospital over a period of thirteen years.

Dr. L. J. Mahoney is investigating the merit of passive immunization against tetanus by a special antitetanus serum of human origin as compared with that induced by the usual serum prepared from horses. He is also studying combined passive and active immunization against tetanus.

Dr. N. T. McPhedran, in association with Dr. C. C. Lucas of the Banting and Best Department of Medical Research, has attempted to produce chronic pancreatitis in rats by a diet deficient in proteins and high in alcohol. Work is in progress to evolve a reliable method of producing acute sub-lethal pancreatitis in dogs. He has also assessed radioactive Rose Bengal as a means of differentiating liver conditions which result in jaundice.

Dr. H. F. Robertson has used plethysmography to assess volume blood flow in limbs which have been treated for occlusive arterial disease by various methods. He is also extending work which he did some years ago designed to augment collateral coronary circulation by the application of irritating substances to the surface of the heart.

Dr. W. J. E. Spence, in collaboration with Dr. J. M. Finlay and assisted by Dr. R. I. Mitchell, has continued studies of fat loss in the stool after various gastro-intestinal operations and in diseases of the gastro-intestinal tract. A comparison of the results obtained by the radioactive fat method and chemical assay casts doubt on the reliability of the former method.

Dr. N. A. Watters is collaborating with Dr. C. B. Brown, of the Department of Medicine, in an investigation of maximum gastric acidity induced by massive doses of histamine combined with antihistamine drugs.

Neurosurgery

Dr. J. F. R. Fleming, at the Toronto Western Hospital, has continued studies commenced at Ann Arbor on the motor function of the parietal lobe in monkeys. He has also commenced a study on the patho-physiology of cerebral oedema in animals.

Dr. E. B. Hendrick, at the Hospital for Sick Children, is studying the use of ventriculo-atrial shunts in the treatment of hydrocephalus and is conducting a follow-up study of twenty-five hundred patients who sustained cerebral injury in childhood.

Dr. W. J. Horsey, in association with Dr. C. Ezrin of the Department of Medicine, and with the assistance of Dr. E. E. Sterns, has studied the effect of induced lesions of the hypothalamus on the diurnal variation in adrenal cortical secretion.

Dr. W. M. Lougheed continues an experimental investigation of the effects on an animal's brain of introducing into the subarachnoid space its own blood without other cerebral injury.

Dr. T. P. Morley has continued to grow human gliomas in tissue culture and has, so far, failed to transplant these tumours from the culture to an experimental animal in spite of various measures which have been used in an attempt to induce tolerance to the tumour in the animal. In association with Dr. W. Anderson, of the Department of Pathology, he continues his study of the incidence and significance of circulating tumour cells in the peripheral blood of patients with intracranial tumours.

Dr. J. W. Scott, with the assistance of Dr. Ian Turnbull, has conducted a study of reflex efferent impulses in the trigeminal nerve.

Orthopaedic Surgery

Dr. F. P. Dewar has directed Dr. A. Buhr, the Workmen's Compensation Board of Ontario Fellow, in a study of the disability associated with local spinal fusion in young workingmen.

Dr. W. R. Harris, with Dr. J.-P. Bedard, has studied the blood supply and nutrition of epiphyseal plates in experimental animals in preparation for attempts to transplant epiphyses.

Dr. P. F. McGoey is continuing a critical study of the results of treatment in fractures of the neck of the femur and indications for arthroplasty of the hip.

Dr. G. F. Pennal has undertaken an investigation of the mechanism of production of fractures and fracture-dislocations of the pelvis and of the results of treatment. He has also reviewed results obtained by primary subtalar arthrodesis for fractures of the os calcis and following fusion of the wrist joint.

Dr. R. B. Salter, working in the Research Institute of the Hospital for Sick Children, with the assistance of Dr. D. A. Gibson, has extended his observations of the effects on joint cartilage produced by prolonged compression. He has demonstrated that even the changes of lesser degree are irreversible and that if the animal is allowed to use the damaged joint a condition develops similar to that found in degenerative arthritis.

Dr. E. H. Simmons, in collaboration with Dr. J. F. Murray, has made an experimental and clinical study of the use of dermis for arthroplasty. He has also undertaken a clinical investigation of patients suffering from severe caisson disease with the object of improving current methods of therapy.

Plastic Surgery

Dr. W. K. Lindsay, working in the Research Institute of the Hospital for Sick Children with the assistance of Dr. E. P. McDougall, has extended his studies of the healing of the flexor tendons in the foot of a chicken. He has investigated the fate of free tendon grafts and also the effect of tendon trauma on the repair process. This study is supplemented by a follow-up examination of the results of flexor tendon repair in the human hand. A long-term follow-up study of the results of treatment of about seven hundred children for cleft lip and cleft palate is nearing completion.

Dr. S. D. Gordon has completed a further study of the fate of buried treated dermis in the rabbit and, with Dr. J. A. Key, has continued the long-term study in the dog of the fate of aortic grafts constructed of treated dermis.

Urology

Dr. W. K. Kerr has directed Dr. S. H. Katz in a number of investigations. A preparation has been developed in which a dog's kidney can be kept in a functional state for a number of hours by a perfusion technique involving a specially constructed pump-oxygenator. This is being used for a study of urinary carcinogens. An alternative method for measuring serum acid phosphatase has been tested and the claims made for it as a more accurate indicator of the presence of prostatic carcinoma were not substantiated. In collaboration with the staff of the Princess Margaret Hospital a survey was made of 725 patients treated by irradiation for carcinoma of the cervix from 1950 to 1955 and examined by cystoscopy and pyelography. The purpose was to determine the incidence of urinary tract involvement in these patients and how this influences prognosis. Dr. Katz has developed a method for producing local hyperthermia of the bladder by using a heat exchanger and bladder irrigation device for the treatment of haemorrhage from the bladder wall.

Dr. C. M. Spooner and the members of the Division of Urology of the Toronto Western Hospital have developed the use of an artificial kidney of standard design in the experimental laboratory and are studying the effect of ligation of branches of the renal artery of the dog.

PUBLICATIONS

BAIRD, R. J. and BIGELOW, W. G. "Surgical Treatment of Aortic Stenosis" (*Canadian Medical Association Journal*, vol. 81, Nov. 15, 1959, pp. 795–800).

BIGELOW, W. G. "Methods for Inducing Hypothermia and Rewarming" (*Annals of the New York Academy of Sciences*, vol. 80, no. 2, 1959, p. 522).

BIGELOW, W. G. and BARNES, W. T. "Ruptured Aneurysm of Aortic Sinus" (*Annals of Surgery*, vol. 150, no. 1, July, 1959, pp. 117–21).

BOTTERELL, E. H. "Strokes as a Neurosurgeon Sees Them" (*Postgraduate Medicine*, vol. 26, Oct., 1959, pp. 413–7).

FLEMING, J. F. R. and BOTTERELL, E. H. "Cranial Dermoid and Epidermoid Tumours" (*Surgery, Gynaecology and Obstetrics*, vol. 109, Oct., 1959, pp. 403–11).

GORDON, S. D. "Contribution of Surgeons to the Development of Upper Canada" (*Bulletin of the Medical Library Association*, vol. 48, no. 1, Jan., 1960, pp. 33–6).

——— "Dupuytren's Contracture: Heredity as an Etiological Factor" (*Canadian Journal of Surgery*, vol. 2, July, 1959, p. 421).

——— "The Hand in Scleroderma" (*Plastic and Reconstructive Surgery*, vol. 23, no. 3, March, 1959, pp. 240–4).

HEIMBECKER, R. O. "Mitral Valve Surgery—Sixty-Five Consecutive Cases Treated by Mitral Commissurotomy with No Operative Mortality" (*Canadian Medical Association Journal*, vol. 80, May 1, 1959, pp. 697–700).

——— *A Study of Recent Developments in Extra-Corporeal Circulation.* Toronto: Ontario Heart Foundation, 1959. Pp. 10. (Mimeo.)

HEIMBECKER, R. O., YOUNG, W. E. and SANDFORD, D. E. "Experimental Studies on the Production of Deep Hypothermia by Means of a Pump Oxygenator and Heat Exchanger, with a Note on the Clinical Application" (*Canadian Journal of Surgery*, vol. 3, Oct., 1959, pp. 79–85).

HENDRICK, E. B. "The Use of Hypothermia in Severe Head Injuries in Childhood" (*Archives of Surgery*, vol. 79, Sept., 1959, pp. 362–4).

JOYNT, G. H. C. and VASSAL, K. P. "Solitary Pulmonary Nodule" (*Canadian Medical Association Journal*, vol. 81, July 15, 1959, pp. 78–81).

KERGIN, F. G. "The Modern Management of Intrathoracic Disease" (*Ontario Medical Review*, vol. 26, no. 10, Oct., 1959, pp. 919–27).

KERR, W. K., HARRIS, R. I. and COULTHARD, H. S. "Renal Tuberculosis: Long Term Review of Cases Followed up from 20 to 35 years" (*British Journal of Surgery*, vol. 47, no. 205, March, 1960, pp. 539–42).

Kerr, W. K., Keresteci, A. G. and Kyle, V. N. "Ileocystoplasty: A, Experimental Studies on Electrolyte Behaviour; B, Clinical Review of 18 Cases" (*Canadian Journal of Surgery,* vol. 3, Oct., 1959, pp. 35–42; Jan., 1960, pp. 134–46).

Kerr, W. K., Keresteci, A. G. and Mayoh, H. "The Distribution of Zinc within the Human Prostate" (*Cancer,* vol. 13, June, 1960, pp. 150–4).

Key, J. A. "Silent Thrombosis in Major Limb Arteries: A Postoperative Hazard" (*Surgery,* vol. 47, no. 5, May, 1960, pp. 734–8).

——— "The Symptomless Abdominal Aneurysm: What should be done about it?" (*Canadian Medical Association Journal,* vol. 82, April, 1960, pp. 924–5).

Key, J. A., Bigelow, W. G. and Farber, E. P. "An Assessment of the Value of Arterial Grafting" (*Surgery,* vol. 47, no. 1, Jan., 1960, pp. 74–8).

Lindsay, W. K. and Thomson, H. G. "Digital Flexor Tendons: An Experimental Study" (*British Journal of Plastic Surgery,* vol. 12, no. 4, Jan., 1960, pp. 289–316).

MacDonald, J. A. and McGoey, P. F. "Fractures of the Articular Portion of the Capitellum of the Humerus in Adults" (*Canadian Medical Association Journal,* vol. 81, Oct. 15, 1959, pp. 634–6).

McGoey, P. F. "Fractures of the Pelvis Occurring in Senile Convulsions" (*Canadian Medical Association Journal,* vol. 80, March 1, 1959, pp. 372–3).

Morley, T. P. "Meningitis: Some Surgical Considerations with Particular Reference to Petrous Fractures" (*Canadian Medical Association Journal,* vol. 81, Dec. 1, 1959, pp. 885–90).

——— "The Recovery of Tumour Cells from Venous Blood Draining Cerebral Gliomas: A Preliminary Report" (*Canadian Journal of Surgery,* vol. 2, July, 1959, pp. 363–5).

——— "Taking the Plunge: Reflections upon the Webster Prize Entries" (*University of Toronto Medical Journal,* vol. 37, Nov., 1959, pp. 13–15).

Mullens, J. E. and Todd, I. A. D. "A Method of Management of Displaced Fractures of the Surgical Neck of the Humerus" (*Canadian Journal of Surgery,* vol. 3, no. 3, April, 1960, p. 243).

Mustard, W. T. "Scoliosis: Diagnosis and Natural History" (*Canadian Medical Association Journal,* vol. 82, April 16, 1960, pp. 815–21).

Mustard, W. T., Rowe, R. R. and Firor, W. B. Jr. "Pulmonic Stenosis in the First Year of Life" (*Surgery,* vol. 47, no. 4, April, 1960, pp. 678–84).

Robertson, D. C. "The Place of Flexor Tendon Grafts in the Repair of Flexor Tendon Injuries to the Hand" (*Clinical Orthopaedics,* vol. 15, 1959, pp. 16–21).

Robson, C. J. and Wilkinson, R. "Renal Hypertension Due to Renal Artery Aneurysm" (*Medical Services Journal,* vol. 16, March, 1960).

Salter, R. B. "Back Pain in Children" (*Medical Graduate,* vol. 5, no. 2, 1958–9, pp. 7–8).

——— "The Effects of Continuous Compression of Articular Cartilage" (*Journal of Bone and Joint Surgery,* vol. 42A, Jan., 1960, pp. 31–49).

Smialowski, A. and Currie, D. J. *Photography in Medicine.* Springfield, Mass.: Charles C. Thomas; Toronto: Ryerson Press. Pp. 330.

Stephens, C. A. "Acute Appendicitis in Children" (*Health,* vol. 27, Nov.-Dec., 1959, pp. 6–7).

Thomson, S. A. "Infantile Hirschsprung's Disease" (*Bulletin of the Hospital for Sick Children,* vol. 8, July, 1959, pp. 56–7).

——— "Volkmann's Ischaemic Contracture" (*Canadian Journal of Surgery,* vol. 3, Jan., 1960, pp. 164–6).

Thomson, S. A. and Mallam, A. S. "Polyps of the Rectum and Colon in Children: A Ten Year Review at the Hospital for Sick Children, Toronto" (*Canadian Journal of Surgery,* vol. 3, Oct., 1959, pp. 17–24).

THERAPEUTICS

Under the direction of Professor K. J. R. Wightman

This department faces increasing problems in attempting to keep in focus an ever-growing complexity of scientific methods of investigation and treatment of patients, and in trying to present these to students in a proper perspective. At the same time, one is aware of the need for an increasing emphasis on the humanistic aspects of treatment and an increasing respect for what they accomplish for the patient. The aim of the course is to inculcate a critical attitude with respect to treatments, and one which is sympathetic toward patients. This is a thing which can only be truly attained when one begins to accept the responsibility for the care of individual patients, but at least an initial bias in this direction can be inculcated in the students.

The profession looks to the University for greater guidance in the evaluation and use of the new drugs which are appearing so rapidly. This is an obligation which is shared by many departments, but one in which the Department of Therapeutics might well play a larger part.

RESEARCH

Dr. William Garvock has studied the variations in plasma volume in relation to serum albumin levels, continuing work carried out by Dr. H. J. Watt previously. He has also studied blood levels attained after oral administration of a new synthetic penicillin, in collaboration with Professor P. H. Greey. Work is also continuing with respect to new chemotherapeutic approaches to the treatment of leukaemia and malignant disease.

BANTING AND BEST DEPARTMENT OF MEDICAL RESEARCH

RESEARCH

Reported by Professor C. H. Best

Members of the staff have undertaken the following research work:

In Professor C. C. Lucas' section, Dr. Lucas and Dr. Jessie H. Ridout have continued their studies of dietary factors affecting the distribution of stainable fat in the hepatic lobules in rats. One of the factors being investigated is the influence of chronic consumption of non-intoxicating amounts of alcohol. The effect of intoxicating doses of alcohol upon the hepatic lipids is receiving further study by Dr. R. J. Gillespie and Dr. Lucas. Some experiments are in progress with Dr. Ridout and Dr. T. M. Sibay (Department of Physiology) concerning the development and treatment of lesions (analogous to those of lathyrism) produced in rats by feeding small amounts of aminoacetonitrile. Dr. Ridout and Dr. Lucas have spent some time collaborating with Dr. N. T. McPhedran (Department of Surgery) in a study of the influence of dietary factors (including alcohol) on the production of pancreatic lesions in rats. They have also assisted Mr. H. G. Cumming of the Fish and Wild Life Branch (Department of Lands and Forests, Ontario) with a study of bone marrow lipids of deer.

In Professor W. R. Franks' section, cancer research directed toward modifying the nature of an animal which develops cancer in such a way as to form a tumour resistant graft-hybrid has been continued, with the assistance of Miss A. McGregor, Miss M. M. Shaw and Mr. J. Skublics. By grafting into susceptible hosts mutually acceptable lymphoid tissue derived from donors induced to be tumour immune, a two-thirds reduction in incidence of leucosis, a virus associated neoplasm, has resulted in the graft-hybrids so formed. Similarly grafting lymphoid tissue from donors immune to solid carcinogen tumours is apparently not so effective. Search for the particular tissues essential for the manifestation of resistance to the latter type of tumour, and optimum methods of hybridization by the graft vaccination technique continues. With Mr. G. A. Meek, co-operative studies on the biological effect of high energy vibrations (noise) are being carried out.

In the sub-department of Synthetic Chemistry, Professor E. Baer and his associates have been successful in achieving the synthesis of enantiomeric mixed-acid α,ρ-diglycerides (Professor D. Buchnea), water-soluble cephalins (Dr. T. Gróf), L-α-N-methyl cephalins (Dr. S. K. Pavanaram), L-α-Phosphatidyl-L,L-hydroxyproline, L-α-glycerylphosphoryl-L,L-hydroxyproline, phosphoryl-L,L-hydroxyproline (Dr.

A. Zschocke), and in developing a method for the chromatographic separation of homologous phosphatides (Professor Buchnea and Dr. Gróf). In all these they were capably assisted by Mr. H. Flehmig.

In Professor G. A. Wrenshall's section, the main interest has centred on the validity and precision of values for the turnover and accumulation of plasma constituents calculated, using a recently-developed tracer method. Of particular importance from these studies is the observation by Dr. G. Hetenyi, Jr., that insulin increases the apparent glucose space in the dog, and by Dr. L. C. Lax and colleagues that both the characteristics of turnover and their probable error can be calculated from data obtained by the tracer method using the IBM-650 computer. Studies on the composition of the human pancreas continue. The findings of sex and age differences in the insulin content of the diabetic human pancreas at autopsy now are paralleled in reports by others of similar differences in the clinical response of diabetic subjects to selected oral hypoglycaemic drugs.

In Professor J. M. Salter's section, Dr. C. K. Gorman has developed techniques for preparing hypophysectomized-eviscerated rabbits and is studying the effects of somatotrophin and insulin on fatty acid and protein metabolism. Miss S. Ruedy has undertaken a study of the effects of glucagon on creatine metabolism in the rat, and has continued studies of the effects on respiratory metabolism in laboratory animals. Dr. Salter and Dr. R. J. S. Metz have investigated factors controlling urea synthesis by rat liver slices *in vitro*. Studies of the mechanism by which glucagon acts to inhibit the growth of malignant cells are also in progress.

In Professor G. R. Williams' section, the enzymic interrelationships of the lipotropic agents have been studied. Dr. J. Blumenstein has investigated the breakdown of the biological methylating agent, S-adenosyl methionine and has discovered a novel pathway for the disposition of this compound in the presence of glycine and certain other amino acids. With Mrs. M. Smithies, the enzymic pathways for the metabolism of choline have been studied, particular attention being paid to the mitochondrial oxidation and its limitation by permeability barriers. Further complexities in the mitochondrial oxidation of succinate have been observed. With Mrs. R. Turnbull, the detailed chemistry of the lipid accumulating in the livers of choline-deficient rats has been studied. With Mrs. C. Goodridge, the lipoprotein enzyme of muscle which catalyses the hydrolysis of adenosine triphosphate has been investigated.

Dr. B. Rosenfeld and Miss Jessie M. Lang have continued their studies on the nature of the liver lipid fraction that is sensitive to dietary choline. They have found that the protein associated with this liver lipid fraction contains a Diphosphopyridine-nucleotide-dehydrogenase but not succindehydrogenase. This enzyme distribution permitted conclusions as to the possible association of the choline sensitive liver lipid fraction with subcellular structures.

In Professor J. Logothetopoulos' section, work has continued on the relationship of zinc to the functional state of the cells of the islets of the pancreas, and on the diabetogenic effect of glucagon and adrenalin in rabbits. A study is in progress on fatty infiltration of the liver, (1) during pregnancy, (2) during insulin treatment, and (3) in newborn animals. Dr. B. B. Sharma, Colombo Plan Fellow, studied the selective inhibition of pituitary trophic hormones by synthetic steroid hormones and completed his M.A. thesis on this subject. Dr. J. Kraicer is extending this work to include investigations on hypothalamo-pituitary relationships and development of a new assay for ACTH. Facilities for electron-microscopy and autoradiography are being developed.

In Professor E. Schönbaum's section, studies on adaptation to cold were continued. The activities of certain enzymes required for the generation of heat were investigated. Jointly with Dr. W. G. Bigelow and Dr. S. Sidlofsky, of the Department of Surgery, research on the hibernating gland of groundhogs was carried out. The control of thyroid function in hypothyroid rats, studied with Professor E. A. Sellers (Department of Pharmacology), appeared to depend on more than one pituitary hormone and is under further investigation.

In Professor D. G. Baker's section, metabolic studies on animals exposed to ionizing radiation have been extended to guinea pigs exposed to the gamma irradiation of a simulated fallout. Mr. G. Vivian has initiated an investigation of recovery rates from whole and partial body irradiation in rats. Other studies include, in collaboration with Dr. G. Clark (Department of Zoology), the influence of dose and dose-rate on radiation injury using both *tetrahymena periformis* and *fagopyrum esculentum* as test systems. In collaboration with Dr. R. Mitchell (Department of Surgery) a comprehensive investigation of gastro-intestinal function in the irradiated rat has been initiated.

Dr. Anna Sirek, with the technical assistance of Miss Y. Hanus, has completed her studies on the toxic effects of oral hypoglycaemic agents in dogs. In collaboration with Dr. O. Sirek (Department of Physiology), studies on levels of blood-glycoproteins have been carried out in offspring of alloxan diabetic rabbits as well as in infants of diabetic mothers.

The Comptroller, Mr. C. R. Cowan, with his assistant, Mr. K. R. Bowler, continues to provide invaluable assistance to both this department and to the Department of Physiology.

PUBLICATIONS

BAER, E. and BUCHNEA, D. "Synthesis of Saturated and Unsaturated L-α-Lecithins: Acylation of the Cadmium Chloride Compound of L-α-glycerylphosphorylcholine" (*Canadian Journal of Biochemistry and Physiology*, vol. 37, Aug., 1959, pp. 953–9).

BAKER, D. G. "Electrolyte Metabolism in the Rat Exposed to a Low Environmental Temperature, II" (*Canadian Journal of Biochemistry and Physiology*, vol. 38, March, 1960, pp. 205–11).

BEST, C. H. "A Canadian Trail of Medical Research" (*Journal of Endocrinology*, vol. 19, June, 1959, pp. i–xvii).

——— "Metabolic Problems Involving the Pancreas, Choline, Insulin and Glucagon" (*Ciba Foundation Symposium on Significant Trends in Medical Research*, 1959, pp. 164–90).

BOGOCH, A., DAVIS, T. W., JOW, E. and WRENSHALL, G. A. "The Clinical Response and the Amount of Insulin Extractable from the Pancreas in Diabetic Patients Treated with Oral Hypoglycaemic Drugs" (*Canadian Medical Association Journal*, vol. 81, Sept. 1, 1959, pp. 347–56).

CLARK, G. M. and BAKER, D. G. "Radiation: The Cellular Approach" (*Canadian Journal of Biochemistry and Physiology*, vol. 38, March, 1960, pp. 320–5).

HEROUX, O. and SCHÖNBAUM, E. "Comparison between Seasonal and Thermal Acclimation in White Rats" (*Canadian Journal of Biochemistry and Physiology*, vol. 37, Nov., 1959, pp. 1255–61).

LOGOTHETOPOULOS, J. and SALTER, J. M. "Morphology and Cytochemistry of Alpha Cells of the Rabbit Pancreas" (*Diabetes*, vol. 9, Jan.-Feb., 1960, pp. 31–7).

LOGOTHETOPOULOS, J., SHARMA, B. B., SALTER, J. M. and BEST, C. H. "Metaglucagon Diabetes in Rabbits" (*New England Journal of Medicine*, vol. 261, Aug. 27, 1959, pp. 423–6).

SALTER, J. M. "Metabolic Effects of Glucagon in the Wistar Rat" (*Federation Proceedings*, vol. 18, no. 1, pt. 1, March, 1959, p. 134).

SCHÖNBAUM, E. and DAVIDSON, MONICA. "Further Studies on the Metabolism of Glucose and the Formation of Corticosteroids *in vitro*" (*Canadian Journal of Biochemistry and Physiology*, vol. 37, Oct., 1959, pp. 1209–14).

SIREK, ANNA, SIREK, O. V., HANUS, Y., MONKHOUSE, F. C. and BEST, C. H. "Effect of Prolonged Administration of Tolbutamide in Depancreatized Dogs" (*Diabetes*, vol. 8, July-Aug., 1959, pp. 284–8).

SIREK, ANNA, SIREK, O. V., HANUS, Y., LOGOTHETOPOULOS, J., MONKHOUSE, F. C. and BEST, C. H. "Effects of Prolonged Administration of Tolbutamide to Normal and Depancreatized Dogs"; in *Proceedings of 3rd Congress of the International Diabetes Federation, Dusseldorf, July 21–25, 1958*, pp. 416–8. Stuttgart: Georg Thiele Verlag. 1959.

SIREK, ANNA, SIREK, O. V., LOGOTHETOPOULOS, J. and BEST, C. H. "Histologic Studies in Tolbutamide Treated Dogs" (*Metabolism*, vol. 8, July, 1959, pp. 577–84).

WILGRAM, G. F. "Cardiovascular Changes Induced in Choline Deficient Rats by Growth Hormone" (*Annals of the New York Academy of Sciences*, vol. 72, Article 14, June 16, 1959, pp. 863–9).

WILGRAM, G. F., BEST, C. H. and LUCAS, C. "The Lipotropic Factors"; in *Proceedings of the World Congress of Gastroenterology, Washington, D.C., 1958*, pp. 658–60. Baltimore: Williams and Wilkins. 1959.

WILLIAMS, G. R. "A Continuous Flow Method for the Determination of Glucose Uptake by Excised Rat Diaphragm" (*Journal of General Physiology*, vol. 42, July, 1959, pp. 1139–54).

WILLIAMS, G. R. "Limiting Factors in the Metabolism of the Liver" (*Revue canadienne de biologie*, vol. 18, Sept., 1959, pp. 217–88).

WRENSHALL, G. A. "Assays for Insulin in the Pancreas"; chap. 32 in *Diabetes* by R. H. Williams, pp. 436–44. New York: P. Hoeber. 1960.

WRENSHALL, G. A. and HETENYI, G. Jr. "Successive Measured Injections of Tracer as a Method for Determining Characteristics of Accumulation and Turnover in Higher Animals with Access Limited to Blood: Tests in Hydrodynamic Systems and Initial Observations on Insulin Reaction in Dogs" (*Metabolism*, vol. 8, July, 1959, pp. 531–43).